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# THE TRANSACTIONS

OF THE

# EDINBURGH OBSTETRICAL SOCIETY

# THE TRANSACTIONS

OF THE

# EDINBURGH OBSTETRICAL SOCIETY.

VOL. XXXIII.

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SESSION 1907-1908.

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# NOTE.

THE views expressed in the Papers contained in this Volume are to be considered as those of the writers themselves, and not as those of the Society as a body.

*October* 1908.

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| | James Ormiston Affleck, M.D., LL.D., F.R.C.S. Ed., F.R.C.P. Ed., . . . . . . . | 1869 |
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| | David Smart, M.B., C.M., *Liverpool*, | 1882 |
| | ***Nathaniel Thomas Brewis, M.B., F.R.C.P. Ed., F.R.C.S. Ed., | 1883 |
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| | *Francis William Nicol Haultain, M.D., F.R.C.P. Ed., | 1884 |
| | *John Struthers Stewart, L.R.C.P. & S. Ed., | 1884 |

| | | Date of Admission. |
|---|---|---|
| 75 | Frederick Anastasius Saunders, F.R.C.S. Ed., L.R.C.P. Ed., *Grahamstown, South Africa,* | 1885 |
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| 90 | Nutting Stuart Fraser, M.B., M.R.C.S. Eng., *St John's, Newfoundland,* | 1887 |
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| 105 | *George Owen Carr Mackness, M.D., C.M., *Broughty-Ferry.* | 1887 |
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| | Robert William Craig, M.D., Ch.B., *Ford*, | 1905 |
| | Henry John Dunbar, M.D., Ch.B., | 1905 |
| | Richard Alfred Blake, M.D., Ch.B., *Pretoria, South Africa*, | 1905 |
| 410 | John Herbert Gibbs, F.R.C.S.Ed., | 1905 |
| | Alice Marion Hutchison, M.D., Ch.B., | 1905 |
| | Barbara Martin Cunningham, M.B., Ch.B., *India*, | 1906 |
| | W. T. Chenhall, M.D., *Sydney*, | 1906 |
| | Alexander Angus Martin, F.R.C.S.Ed., *North Shields*, | 1906 |
| 415 | James Andrew Gunn, M.D., Ch.B., | 1906 |
| | James Lawson Russell, M.B., Ch.B., *Todmorden*. | 1906 |
| | Archibald M'Kendrick, L.R.C.P. & S.Ed., *Kirkcaldy*, | 1906 |
| | Alexander Scott, M.B., C.M., *Broxburn*, | 1906 |
| | Archibald Simpson, M.B., Ch.B., *Bristol*. | 1906 |
| 420 | Hirjee Nowon Anklesaria, L.R.C.P. & S.Ed., *Bombay*, | 1906 |
| | Archibald Cotterell M'Master, M.B., Ch.B. | 1906 |
| | Arthur James Lewis, M.B., Ch.B., | 1906 |
| | Herbert Park Thompson, M.D., Ch.B., *Peterborough*, | 1906 |
| | Samuel Davidson, M.D., C.M., *Kelso*, | 1906 |
| 425 | William Fowler Godfrey, M.B., C.M., *Manitoba*, | 1906 |
| | H. St John Randell, M.B., Ch.B., *Cape Colony*, | 1906 |
| | Kaikhuson Dadabhoy, F.R.C.S.Ed., L.R.C.P.Ed., *India*, | 1906 |
| | Edward Burnet, M.B., Ch.B., | 1906 |
| | Arthur Samuel Walker, M.B., Ch.B., *Ashley*, | 1906 |
| 430 | Archibald Dunlop Stewart, M.B., L.R.C.S. Ed., | 1906 |
| | Edward Alexander Elder, M.B., Ch.B., | 1906 |
| | Ethelbert William Dyer, M.B., Ch.B., *London*, | 1906 |
| | William Torrance Smith, M.B., Ch.B., *Midcalder*, | 1906 |
| | Arnold Davies, M.B., Ch.B., *Menai Bridge*, | 1906 |
| 435 | John Bruce M'Moreland, M.B., Ch.B., | 1906 |
| | William Omand Sclater, M.B., Ch.B, *Jarrow-on-Tyne* | 1906 |
| | Archibald George Kirkwood Ledger, M.B., Ch.B., *Darwen* | 1906 |
| | Frederick James Greig, L.R.C.P. & S.I., Lt.-Col., R.A.M.C., *Stirling*, | 1906 |
| | Duncan Lorimer, M.B., Ch.B., | 1906 |
| 440 | Charles Robert Paterson Mitchell, *Malvern*, | 1906 |
| | William David Osler, | 1906 |
| | John Halley Meikle, M.D., | 1906 |
| | David Lloyd Roberts, M.D., F.R.C.P., *Manchester*, | 1906 |
| | Alexander Murray Drennan, | 1907 |
| 445 | Mary Caroline Hamilton, L.R.C.P. & S. Ed.. L.F.P.S. Glasg., | 1907 |
| | Elsie Mary Macmillan Barnetson, M.B., Ch.B., *Joppa*, | 1907 |
| | John Andrew Macleod, M.B., Ch.B., *Inverness* | 1907 |
| | Hugh Smith Reid, M.D., Ch.B., *Hessle* | 1907 |
| | Allan Macdonald Dick, M.B., Ch.B., | 1907 |
| 450 | Angus Buchanan, M.B., Ch.B., | 1907 |
| | William Bow Tannahill, M.B., Ch.B., *Greenock*, | 1907 |
| | David Lees, M.B., Ch.B., *Ayr*, | 1907 |
| | Aubrey Middleton Hewat, M.B., Ch.B., | 1907 |
| | Isabella Beattie Venters, M.B., Ch.B., | 1907 |
| 455 | Gerald Hall Lloyd Fitzwilliams, M.B., F.R.C.S., *Newcastle-Emlyn*, | 1907 |
| | Arthur Percy Wall, M.B., Ch.B., | 1907 |
| | George Raffan, M.B., Ch.B., | 1907 |
| | Ronald Græme Scott Orbell, M.D., Ch.B., | 1907 |

| | | Date of Admission. |
|---|---|---|
| | John Alexander Gray, M.B., Ch.B. | 1907 |
| 460 | Cecil Hobart Houghton, M.B., Ch.B., *Bradford,* | 1907 |
| | Robert Patrick M'Morland, M.B., Ch.B., | 1907 |
| | James Young, M.B., Ch.B., | 1907 |
| | John Nigel Stark, M.D., F.F.P.S.G., *Glasgow,* | 1908 |
| | Alfred Edward Bennee, M.B., Ch.B., | 1908 |
| 465 | Norman Scott Carmichael, M.B., Ch.B., | 1908 |
| | John Alexander Manifold, M.B., Ch.B., *Liberton,* | 1908 |
| | Harley Patterson Milligan, M.D., *London,* | 1908 |
| | Thomas Yule Finlay, M.B., Ch.B., | 1908 |
| 469 | David Lawrence Luckhoo, M.D., L.R.C.P.S.Ed., *British Guiana,* | 1908 |

## ORDINARY FELLOWS.

### ARRANGED ALPHABETICALLY.

### (*a.*) LIFE MEMBERS.

| | | |
|---|---|---|
| | Adam, Dr George Rothwell, 84 Collins St., Melbourne, Aus., | 1879 |
| | Anderson, Dr John, Newholme, Pitlochry, | 1896 |
| | Ballantyne, Dr Harold S., Ashton, Eskbank, Dalkeith, | 1897 |
| | Ballantyne, Dr J. W., 24 Melville Street, | 1883 |
| 5 | Barbour, Dr A. H. Freeland, 4 Charlotte Square, | 1879 |
| | Barclay, Dr William John, Invercargill, New Zealand, | 1899 |
| | Brock, Dr G. Sandison, 2 Via Veneto, Rome, | 1894 |
| | Burnet, Dr Edward, 4 Fingal Place, | 1906 |
| | Cavanagh, Dr Francis, 396 Ecclesall Road, Sheffield, | 1903 |
| 10 | Chipman, Dr W. W., 285 Mountain St., Montreal, Canada, | 1895 |
| | Chenhall, Dr William T., 233 Macquarie St., Sydney, Australia, | 1906 |
| | Craig, Dr John, 71 Bruntsfield Place, | 1900 |
| | Craig, Dr William, 71 Bruntsfield Place, | 1870 |
| | Croom, Dr David Halliday, 17 Alva St., | 1903 |
| 15 | Croom, Prof. Sir John Halliday, 25 Charlotte Square, | 1870 |
| | Cumming, Dr John, 70 Bruntsfield Place, | 1896 |
| | Dobell, Dr C. B., 1 Royal Well Terrace, Charlton, Cheltenham, | 1904 |
| | Dumat, Dr Henry Aylmer, 7 Devonshire Place, Durban, Natal, South Africa, | 1898 |
| | Fitzwilliams, Dr Gerald Lloyd, Cilgwyn, N.C. Emlyn, R.S.O., Carmarthenshire, | 1907 |
| 20 | Fleming, Dr Andrew M., C.M.G., Salisbury, Rhodesia, | 1904 |
| | Fowler, Dr Simson, Waverley, Juniper Green, | 1892 |
| | Frost, Dr Edmund, Chesterfield, Meads, Eastbourne, | 1905 |
| | Gibson, Dr R. Wilson, Town Head House, Orton, Tebay, | 1903 |
| | Grant, Dr Lewis, Neston, Cheshire, | 1896 |
| 25 | Hart, Dr D. Berry, 5 Randolph Cliff, | 1877 |
| | Inch, Dr Robert, Gorebridge, | 1887 |
| | Livingston, Dr George R., 47 Castle Street, Dumfries, | 1898 |
| | Luckhoo, Dr David Lawrence, New Amsterdam, British Guiana, | 1908 |
| | M'Arthur, Dr W. Taylor, 959 S. Figueroa St., Los Angeles, California, | 1901 |
| 30 | M'Brearty, Dr J. Wilson, Greymouth, West Coast, New Zealand, | 1899 |

| | | Date of Admission. |
|---|---|---|
| | M'Farlane, Dr Hilda M., Bendameer, Burntisland, | 1901 |
| | Macnab, Dr James, C. G., The Towers, Dysart, | 1904 |
| | Maddox, Dr Ralph H., I.M.S., c/o Messrs Thomas Cook & Son, Ludgate Corner, London, E.C., | 1887 |
| | Martin, Dr Christopher, Cleveland House, George Road, Edgbaston, Birmingham, | 1888 |
| 35 | Melville, Dr Kenmure, 2 Nile Grove, | 1900 |
| | Morgan, Dr T. H., Gympie, Queensland, Australia, | 1895 |
| | Mules, Dr P. Henry, Bishopdale, Nelson, New Zealand, | 1903 |
| | Pereira, Dr A. A. Jervis, Consul de Grèce en Mozambique, Lourenço Marques, Delagoa Bay, South Africa, | 1888 |
| | Pitts, Dr Edith Cochrane-Brown, Strathmore, Christ Church, New Zealand, | 1905 |
| 40 | Ponder, Dr Charles F., The Red House, Bordyke, Tonbridge | 1892 |
| | Ranking, Dr J. E., Tunbridge Wells, | 1881 |
| | Ross, Dr James F. W., 481 Sherbourne Street, Toronto, Canada, | 1889 |
| | Russell, Dr J. Lawson, West Lodge, Tormorden, | 1906 |
| | Simpson, Dr G. F. Barbour, 50 Melville Street, | 1898 |
| 45 | Simpson, Dr W. Petrie, Viewbank, Bathgate, | 1892 |
| | Simson, Dr H. J. F., 36 Grosvenor Street, London, W., | 1897 |
| | Sloss, Dr William, Sturt Street, Ballarat, Australia, | 1902 |
| | Struthers, Dr John, Nqamakwe, Transkei, South Africa, | 1895 |
| | Vatve, Dr Gopal Govind, c/o H.H. The Rajah of Miraj, Bombay, India, | 1894 |
| 50 | Wells, Dr A. Simpson, 56 Orange Street, Cape Town, South Africa, | 1903 |

## (b.) ANNUAL SUBSCRIBERS.

| | | |
|---|---|---|
| | Aarons, Dr S. Jervois, 6 Hartley Street, Cavendish Square, London, W., | 1896 |
| | Adams, Dr Russell G. W., Langley Dale, Blenheim, New Zealand | 1904 |
| | Affleck, Dr J. O., 38 Heriot Row, | 1869 |
| | Ainslie, Dr A. C., 49 Minto Street, | 1898 |
| 55 | Aitken, Dr C. J. Hill, 38 Argyle Street, East London, South Africa, | 1902 |
| | Alexander, Dr W. B., 8 Blenheim Place, | 1882 |
| | Allison, Dr J., Fuller House, Kettering, Northampton, | 1888 |
| | Andrew, Dr James, 2 Atholl Crescent, | 1868 |
| | Anklesaria, Dr H. N., 12 Colaba Causeway, Bombay, India, | 1906 |
| 60 | Armitage, Dr J. A., 58 Waterloo Road Wolverhampton, | 1886 |
| | Armour, Dr E. F., 6 Bruntsfield Terrace, | 1889 |
| | Aspland, Dr W. H. Graham, Church of England Mission, Peking, China, | 1901 |
| | Baildon, Dr F. J., 42 Hoghton Street, Southport, | 1887 |
| | Ballantyne, Dr A., Ashton, Eskbank, Dalkeith, | 1870 |
| 65 | Barnardo, Dr F. A. F., Capt. I.M.S., Ferozepore, Punjab, India, | 1899 |
| | Barnetson, Dr Elsie M., 31 Morton Street, Joppa, | 1907 |
| | Barnetson, Dr R. Balfour, 31 Morton Street, Portobello, | 1904 |
| | Barrington, Dr Fourness, 213 Macquarrie Street, Sydney, Australia, | 1884 |
| | Barry, Dr W. J. M., 29 Plymouth Road, Penarth, Glamorgan, | 1898 |
| 70 | Bateman, Dr F. J. Harvey, Heath End, Blackheath, Lond., S.E., | 1898 |
| | Beatty, Dr Samuel, Craigvar, Pitlochry, | 1888 |

| | | Date of Admission |
|---|---|---|
| | Beesley, Dr R. W., 135 Deane Road, Bolton, | 1894 |
| | Beesly, Dr Lewis, 13 Torphichen Street, | 1904 |
| | Bell, Dr J. Lumsden, The White Hall, Driffield, Yorkshire, | 1884 |
| 75 | Bennee, Dr A. E., 16 Spottiswoode Road, | 1908 |
| | Bentley, Dr G. H., Loanhead House, Kirkliston, | 1877 |
| | Beveridge, Dr Robert, 9 James Place, Leith, | 1896 |
| | Blaikie, Dr R. H., 10 Mayfield Gardens, | 1888 |
| | Blair, Dr J. A., 16 Windsor Terrace, Newcastle-on-Tyne, | 1887 |
| 80 | Blake, Dr R. A., Padnoller, Sunnyside, Pretoria, South Africa, | 1905 |
| | Boddie, Dr G. P., 73 Bruntsfield Place, | 1889 |
| | Booth, Dr William, 2 Minto Street, | 1891 |
| | Borrowman, Dr Philip G., Dunreggan, Troon, | 1893 |
| | Boxill, Dr N. L., Buttalls, St George, Barbados, | 1888 |
| 85 | Brand, Dr Eden, Bellfield, Banchory, | 1903 |
| | Brewis, Dr N. T., 6 Drumsheugh Gardens, | 1883 |
| | Brewis, Dr R. Adams, The West Gate, Dursley, Gloucestershire, | 1888 |
| | Broad, Dr B. W., The Sanitorium, Cardiff, | 1895 |
| | Brodie, Dr T. Scott, 21 Belhaven Terrace, Wishaw, | 1900 |
| 90 | Brown, Dr H. Grey, 47 Evan Street, Stonehaven, | 1905 |
| | Brown, Dr William, Braemar, | 1904 |
| | Brownlee, Dr James, 6 Seaton Terrace, Linthrope Road, Middlesbrough, | 1905 |
| | Buchanan, Dr Angus, 48 Bruntsfield Gardens, | 1907 |
| | Buist, Dr J. W., 1 Clifton Terrace, | 1877 |
| 95 | Buist, Dr R. C., 166 Nethergate, Dundee, | 1895 |
| | Bunting, Dr W. Hartley, 20 Hagley Road, Edgbaston, Birmingham, | 1900 |
| | Burton, Dr Thomas J., Port Hedland, West Australia, | 1896 |
| | Butchart, Dr C. A., 52 Leith Walk, Leith, | 1894 |
| | Cairns, Dr W. Murray, 67 Catherine Street, Liverpool, | 1892 |
| 100 | Calder, Dr H. L., 60 Leith Walk, Leith, | 1882 |
| | Callender, Dr D. A., Hazelmere, Toft Road, Knutsford, Cheshire, | 1901 |
| | Callender, Dr D. M., 6 Rose Bank, Lancaster, | 1902 |
| | Callender, Dr T. M., Inverard, Sidcup, | 1896 |
| | Cameron, Prof. James C., M.D., 605 Dorchester Street, W., Montreal, | 1888 |
| 105 | Campbell, Dr Malcolm, Brechin | 1900 |
| | Carmichael, Dr Edward, 21 Abercromby Place, | 1887 |
| | Carmichael, Dr E. W. Scott, 32 Rutland Square, | 1899 |
| | Carmichael, Dr James, 22 Northumberland Street, | 1871 |
| | Carmichael, Dr N. Scott, 22 Northumberland Street, | 1908 |
| 110 | Carruthers, Dr G. J. R., 4 Melville Street, | 1901 |
| | Cattanach, Dr J. G., 3 Alvanley Terrace, | 1893 |
| | Church, Dr H. M., 36 George Square, | 1875 |
| | Clark, Dr A. W. G., 24 Braid Crescent, | 1901 |
| | Clark, Dr J. A., 4 Cambridge Street, | 1887 |
| 115 | Clark, Dr Katherine S., Craigleith Poorhouse, | 1903 |
| | Cobbett, Dr C. N., Edmonton, Alberta, Canada, | 1890 |
| | Cox, Dr Joshua J., 38 Deansgate, Manchester, | 1876 |
| | Craig, Dr R. W., Pathhead-Ford, Dalkeith, | 1905 |
| | Croudace, Dr J. H., Foregate House, Stafford, | 1878 |
| 120 | Cullen, Dr G. M., 50 Minto Street, | 1890 |
| | Cunningham, Dr Barbara M., Dufferin Hospital, Nagpur, Central Provinces, India, | 1906 |
| | Currie, Dr A. S., 20 Oxford Terrace, Hyde Park, London, W., | 1882 |
| | Dadabhoy, Dr K., Karachi, India, | 1906 |
| | Darling, Dr T. Brown, 13 Merchiston Place, | 1884 |
| 125 | Darling, Dr William, 2 Warrender Park Terrace, | 1900 |

| | | Date of Admission. |
|---|---|---|
| | Davidson, Dr D. G., 9 Granville Terrace, | 1892 |
| | Davidson, Dr H. S., 4 Dundas Street, | 1904 |
| | Davidson, Dr Samuel, Kelso, | 1906 |
| | Davies, Dr Arnold, Grammar School, Menai Bridge, North Wales, | 1906 |
| 130 | Dendle, Dr Frank, Overton House, Spring Grove, Isleworth, | 1892 |
| | Deverell, Dr H. C., 12 Windsor Street, | 1882 |
| | Dewar, Dr M., 24 Lauriston Place, | 1891 |
| | Dick, Dr A. M., The Chalmers Hospital, Lauriston Place, | 1907 |
| | Dickie, Dr J. T., 37 Lauriston Place, | 1900 |
| 135 | Dickson, Dr George, 9 India Street, | 1867 |
| | Dickson, Dr George, 14 Ardmillan Terrace, | 1901 |
| | Dobie, Dr D. Robertson, Heathfield, Crieff, | 1894 |
| | Donald, Dr C. W., 28 Portland Square, Carlisle, | 1895 |
| | Drennan, Dr A. Murray, 36 Woodburn Terrace, | 1907 |
| 140 | Dunbar, Dr H. J., 3 Hampton Terrace, | 1905 |
| | Duncan, Dr A. J., 158 Nethergate, Dundee, | 1879 |
| | Dunlop, Dr H. M., 20 Abercromby Place, | 1884 |
| | Dyer, Dr E. W., c/o Messrs Webster, Steel & Co., 5 East India Avenue, Leadenhall Street, London, E.C., | 1906 |
| | Eason, Dr John, 58 Northumberland Street, | 1899 |
| 145 | Easterbrook, Dr A. M., Arnprior, Gorebridge, | 1893 |
| | Easterbrook, Dr C. C., Crichton House, Dumfries | 1892 |
| | Easton, Dr Thomas, 23 East Park Terrace, Southampton, | 1894 |
| | Eden, Dr T. Watts, 26 Queen Anne Street, Cavendish Square, London, W., | 1888 |
| | Edington, Dr D. C., Birbeck House, Penrith, | 1897 |
| 150 | Elder, Dr Edward A., 6 Torphichen Street, | 1906 |
| | Elder, Dr Eleanor, 4 John's Place, Leith, | 1903 |
| | Elder, Dr W. Nicol, 6 Torphichen Street, | 1879 |
| | Evans, Dr O. F., 20 Princes Avenue, Liverpool, | 1890 |
| | Farie, Dr G. J., Strathallan House, Bridge of Allan, | 1903 |
| 155 | Farquharson, Dr J. D., 242 Westgate Road, Newcastle-on-Tyne, | 1890 |
| | Faulkner, Dr Hugh, St John's House, Banbury, Oxon, | 1902 |
| | Felkin, Dr R. W., 47 Bassett Road, North Kensington, London, W., | 1884 |
| | Ferguson, Dr J. Haig, 7 Coates Crescent, | 1885 |
| | Ferguson, Dr P. J. H., 9 Windsor Street, | 1900 |
| 160 | Ferguson, Dr R. T., Middlemarch, Anstruther, Fife, | 1895 |
| | Finlay, Dr T. Y., c/o John S. Mercer, Esq., 52 Northumberland Street, | 1908 |
| | Finlay, Dr W. A., 50 Trinity Road, | 1880 |
| | Fitzwilliams, Dr D. C. L., 64 Brook Street, Grosvenor Square, London, W., | 1904 |
| | Fleming, Dr Andrew, St John's Road, Corstorphine, | 1905 |
| 165 | Flett, Dr A. B., 60 George Square, | 1903 |
| | Forbes, Dr J. Christie, Ardveich, Liberton, | 1898 |
| | Fordyce, Dr A. Dingwall, 19 Coates Crescent, | 1899 |
| | Fordyce, Dr William, 20 Charlotte Square, | 1888 |
| | Fothergill, Dr W. Edward, 337 Oxford Road, Manchester, | 1894 |
| 170 | Forrester, Dr C. C., 3 Albert Terrace, | 1898 |
| | Fowler, Dr W. Hope, 5 St Vincent Street, | 1900 |
| | Fox, Dr J. W., 18 Bernard Street, Southampton, | 1887 |
| | Fraser, Dr J. Hossack, Fernfield, Bridge of Allan, | 1895 |
| | Fraser, Dr Nutting S., 205 Gower Street, St John's, Newfoundland, | 1887 |
| 175 | Frost, Dr W. E., 6 Atholl Place, | 1900 |
| | Garbutt, Dr W. J., 1 Bournbrook Rd., Selly Pk., Birmingham, | 1897 |

| | | Date of Admission. |
|---|---|---|
| | Gardiner, Dr Frederick, 9 George Square, | 1900 |
| | Gavin, Dr Alfred T., Doonlea, Dunaskin, | 1905 |
| | Gayton, Dr William, Ravensworth, Regent's Park Road, Finchley, London, N., | 1885 |
| 180 | Gemmell, Dr J. E., 28 Rodney Street, Liverpool, | 1885 |
| | Gibbons, Dr Sherwin, 1013 Braly Building, Los Angeles, California, | 1904 |
| | Gibbs, Dr J. H., 12 Coates Crescent, | 1905 |
| | Gibson, Dr Cameron R., 101 Forest Road, Nottingham, | 1903 |
| | Giffen, Dr J. T. M., 138 Boughton, Chester, | 1892 |
| 185 | Giles, Dr A. B., 4 Palmerston Place, | 1891 |
| | Gilmour, Dr T. F., Port Ellen, Islay, | 1882 |
| | Godfrey, Dr W. F., Carberry, Manitoba, Canada | 1906 |
| | Graham, Dr A., Curriebank, Currie, | 1897 |
| | Graham, Dr D. J., 26 Rutland Street, | 1895 |
| 190 | Graham, Dr F. M., 16 Mayfield Gardens, | 1894 |
| | Graham, Dr J. Gibson, 17 Ashton Ter., Dowanhill, Glasgow, | 1888 |
| | Graham, Dr R. Balfour, Leven, Fife, | 1893 |
| | Gray, Dr J. A., 4 Wolseley Terrace, | 1907 |
| | Green, Dr John Ligertwood, 23 Minto Street, | 1902 |
| 195 | Greene, Dr T. W. N., 45 Dartmouth Square, Leeson Park, Dublin, | 1889 |
| | Gregory, Dr W. H., North Bar Street, Beverley, Yorks, | 1893 |
| | Greig, Dr F. J., Lt.-Col. R.A.M.C., 16 Melville Ter., Stirling, | 1906 |
| | Gunn, Dr J. A., 18 Morningside Drive, | 1906 |
| | Guthrie, Dr A. Cowan, 21 Pilrig Street, | 1888 |
| 200 | Hamilton, Dr J. R., Elm House, Hawick, | 1879 |
| | Hamilton, Dr Mary, Pengavil, St Agnes, Cornwall, | 1907 |
| | Hamp, Dr J. Walton, Penn Road, Wolverhampton, | 1886 |
| | Hardie, Dr Mabel, Candele, 577 Finchley Road, Hampstead, London | 1902 |
| | Harley, Dr R. J., c/o Primrose Club, Park Place, St James', London, S.W., | 1905 |
| 205 | Harlin, Dr Francis W., Peak Downs District Hospital, Clermont, Queensland, | 1900 |
| | Harper, Dr R. A. J., 32 Victoria Avenue, Barrow-in-Furness, | 1901 |
| | Harvey, Dr Charles, Beckford Lodge, Sav-la-Mar, Jamaica, W.I., | 1889 |
| | Harvey, Dr James, 7 Blenheim Place, | 1891 |
| | Haultain, Dr F. W. N., 12 Charlotte Square, | 1884 |
| 210 | Havelock, Dr John G., Sunnyside, Montrose, | 1888 |
| | Hay, Dr Henry, 11 Great King Street, | 1879 |
| | Hellier, Dr J. B., Glengariff, North Grange Road, Headingley, Leeds, | 1904 |
| | Helm, Dr J. H., Clarence Cottage, Ratho, | 1888 |
| | Helm, Dr R. Dundas, 13 Portland Square, Carlisle, | 1892 |
| 215 | Helme, Dr G. Edgar, Gloucester House, Rusholme, Manchester, | 1895 |
| | Henderson, Dr Alexander, 21 Pitt Street, | 1891 |
| | Hewat, Dr A. Middleton, 19 Great Stuart Street, | 1907 |
| | Hewetson, Dr J., Holmfield, Reigate, | 1881 |
| | Hindmarsh, Dr Edwin, Mozufferpore, Tirhoot State Railway, Bengal, India, | 1895 |
| 220 | Hobson, Dr H. Overton, Villa Sakkara, Helouan, Egypt | 1901 |
| | Hoggan, Dr Robert, Liberton Park, Liberton, | 1894 |
| | Holmested, Dr C. W., Tuxford, Newark, Notts, | 1900 |
| | Houghton, Dr C. Hobart, 1 Hallfield Road, Bradford, | 1907 |
| | Hughes, Dr P. T., County Asylum, Broomsgrove, Worcestershire, | 1895 |
| 225 | Hunter, Dr George, 33 Palmerston Place, | 1881 |

| | | Date of Admission. |
|---|---|---|
| | Hutcheson, Dr J., 44 Moray Place, | 1888 |
| | Hutchison, Dr Alice M., 204 Bruntsfield Place, | 1905 |
| | Inglis, Dr Elsie M., 8 Walker Street, | 1901 |
| | Jamieson, Dr Hugh, 1 Strathearn Road | 1889 |
| 230 | Jamieson, Dr J. Boyd, 43 George Square, | 1900 |
| | Jardine, Dr Robert, 20 Royal Crescent, Glasgow, W., | 1897 |
| | Jeffrey, Dr John, Glen Bank, Jedburgh, | 1901 |
| | Johnston, Dr Robert B., Bishopyards, Penrith, | 1903 |
| | Johnston, Dr R. J., 18 George Square, | 1899 |
| 235 | Johnstone, Dr R. W., 13 Torphichen Street, | 1903 |
| | Jones, Dr W. Llewellyn, 58 Thomas St., Merthyr-Tydvil, | 1903 |
| | Keay, Dr J. W., 12 Brougham Place, | 1903 |
| | Keiller, Prof. Wm., 210 Levy Building, Galveston, Texas, U.S.A., | 1890 |
| | Keir, Dr Ian C., The Limes, Melksham, Wilts, | 1903 |
| 240 | Ker, Dr Claude B., City Hospital, Comiston Road, | 1894 |
| | Kerr, Dr J. M. Munro, 7 Clairmont Gardens, Glasgow, | 1894 |
| | Kerr, Dr J. Wishart, 107 Greenhead Street, Glasgow, | 1901 |
| | King, Dr J. K., The Glen Springs Sanitorium, Watkins, New York, U.S.A., | 1884 |
| | Kirk, Dr Robert, Rowan Bank, Bathgate, | 1887 |
| 245 | Kirkness, Dr J. M., 14 Dalkeith Road, | 1903 |
| | Kynoch, Professor Campbell, 8 Airlie Place, Dundee, | 1892 |
| | Lackie, Dr James Lamond, 1 Randolph Crescent, | 1889 |
| | Laing, Dr J. H. A., 11 Melville Street, | 1891 |
| | Langwell, Dr H. G., 4 Hermitage Place, Leith, | 1891 |
| 250 | Leary, Dr T. Garnet S., Grand Hotel, Melbourne, Australia, | 1904 |
| | Ledger, Dr A. G. K., 16 Bank Street, Darwen, | 1906 |
| | Lee, Dr Herbert E., Coolabah, Belmore Street, Burwood, N.S.W., Australia, | 1892 |
| | Lees, Dr David, Lagg, Ayr, | 1907 |
| | Lewis, Dr Arthur J., c/o R. Shaw, Esq., 36 Woodburn Terrace, | 1906 |
| 255 | Littlejohn, Professor Harvey, 11 Rutland Street, | 1890 |
| | Lochhead, Dr James, Earlston, | 1904 |
| | Lockhart, Dr F. A. L., 23 Mackay Street, Montreal, Canada, | 1890 |
| | Lorimer, Dr Duncan, 74 Bruntsfield Place, | 1906 |
| | Low, Dr R. Cranston, 6 Castle Terrace, | 1902 |
| 260 | Lyell, Dr John, 15 Marshall Place, Perth, | 1901 |
| | Lyle, Dr R. P. Ranken, 11 Ellison Place, Newcastle-on-Tyne, | 1901 |
| | MacArthur, Dr D. G., Aberfeldy, | 1903 |
| | M'Call, Dr John, 25B Abercromby Terrace, Portobello, | 1886 |
| | M'Cann, Dr F. J., 5 Curzon Street, Mayfair, London, W., | 1896 |
| 265 | Macdonald, Dr A. G., Drummore, Kirkmaiden, Wigtownshire, | 1903 |
| | Macdonald, Dr Angus, 27 Manor Place, | 1897 |
| | Macdonald, Dr John, Marathon House, Cupar-Fife, | 1902 |
| | Macdonald, Dr W. Fraser, 16 Buckingham Ter., Glasgow, W., | 1884 |
| | M'Ewan, Dr Peter, Royal Infirmary, Bradford, Yorks, | 1905 |
| 270 | M'Gibbon, Dr John, 22 Heriot Row, | 1902 |
| | MacGregor, Dr Alastair, Stafford Lodge, Market Harborough, | 1905 |
| | MacGregor, Dr A. V., Durham House, West Hartlepool, | 1895 |
| | MacGregor, Dr Donald, Seaton House, Jedburgh, | 1900 |
| | Macgregor, Dr G. S., 2 Burnbank Terrace, Glasgow W., | 1888 |
| 275 | M'Ilwraith, Dr Kennedy C., 54 Avenue Rd., Toronto, Canada, | 1901 |
| | Mackay, Dr George, 74 Bruntsfield Place, | 1879 |
| | Mackay, Dr W. B., 23 Castlegate, Berwick-on-Tweed, | 1899 |
| | M'Kendrick, Dr Archd., 120 High St., Kirkcaldy, | 1906 |
| | Mackenzie, Dr R., Napier, Nairn, | 1887 |
| 280 | Mackenzie, Dr T. C., District Asylum, Inverness, | 1900 |

| | | Date of Admission. |
|---|---|---|
| | M'Kerron, Dr R. Gordon, 1 Albyn Place, Aberdeen, | 1896 |
| | Mackie, Dr George, Boyd's Lodge, Malvern, Worcestershire, | 1900 |
| | Mackin, Dr Patrick, 12 Ingestre St., Wellington, New Zealand, | 1895 |
| | Mackness, Dr G. Owen C., Fort Street House, Broughty-Ferry, | 1887 |
| 285 | Maclagan, Dr D. W., Kaponga, Taranaki, New Zealand, | 1901 |
| | M'Larty, Dr Malcolm, 7 Bellevue Place, | 1900 |
| | M'Lean, Dr Archibald, Crosshouse, Kilmarnock, | 1890 |
| | Maclean, Dr Ewen, J., 12 Park Place, Cardiff, | 1902 |
| | Macleod, Dr J. A., The Asylum, Inverness, | 1907 |
| 290 | M'Master, Dr A. C., Australasian Club, Melbourne Place, | 1906 |
| | Macmillan, Dr John, 48 George Square, | 1897 |
| | M'Morland, Dr J. B., 19 Merchiston Gardens, | 1906 |
| | M'Morland, Dr R. P., 19 Merchiston Gardens, | 1907 |
| | MacRae, Dr John, Lynwood, Murrayfield, | 1893 |
| 295 | MacVie, Dr S., Chirnside, | 1881 |
| | M'Watt, Dr John Morelands, Duns, | 1879 |
| | Macwatt, Dr R. C., 7th Bengal Cavalry, c/o Messrs King, King & Co., Post Office Box No. 110, Bombay, India, | 1885 |
| | Malcolmson, Dr Alexander M., Dalveen, St John's Road, Corstorphine, | 1901 |
| | Maloney, Dr W. J., Kasr-El. Aing. Hospital, Cairo, | 1905 |
| 300 | Manifold, Dr J. A., Braefoot, Liberton, | 1908 |
| | Marshall, Dr G. Balfour, 19 Sandyford Place, Glasgow, | 1891 |
| | Marshall, Dr William, Milnathort, | 1884 |
| | Martin, Dr Angus, 25 Northumberland Square, North Shields, | 1906 |
| | Martin, Dr Charles, Dagenham House, Newton Abbot, South Devon, | 1892 |
| 305 | Martin, Dr J. W., Charterhall, Newbridge, Dumfries, | 1887 |
| | Matheson, Dr A. A., 41 George Square, | 1887 |
| | Matheson, Dr R. Murdoch, 33 Buccleuch Place, | 1897 |
| | Mathewson, Dr G. D., 25 Cluny Gardens, | 1905 |
| | Meikle, Dr J. Hally, 12 Midmar Gardens, | 1906 |
| 310 | Menzies, Dr David, 20 Rutland Square, | 1877 |
| | Michael, Dr Gustave, Bayham House, 135 West End Lane, London, N.W., | 1885 |
| | Millard, Dr W. W., Middlefield House, Leith Walk, | 1884 |
| | Miller, Dr Alexander, 1 Royal Terrace, Crosshill, Glasgow, | 1902 |
| | Miller, Dr W. H., 51 Northumberland Street, | 1886 |
| 315 | Milligan, Dr Harley P., c/o W. L. Milligan, Esq., River Plate House, South Place, London, E.C. | 1908 |
| | Milne, Dr W. M., 10 Newington Road, | 1898 |
| | Mitchell, Dr C. R. P., The Chase, Malvern, | 1906 |
| | Mitchell, Dr G. B., 1 Skinner Street, Whitby, | 1893 |
| | Mitchell, Dr R. M., Government Hospital, Coolgardie, Western Australia, | 1900 |
| 320 | Montgomery, Dr John, The Highlands, Balsall Heath, Birmingham, | 1895 |
| | Moorhouse, Dr J. Ernest, 6 Melville Terrace Stirling, | 1892 |
| | Morison, Dr Albert E., Mowbray Villa, Sunderland, | 1888 |
| | Morris, Dr S. Glanville, Brynawel, Mardy, Glamorganshire | 1894 |
| | Moses, Dr O. St John, c/o Messrs King, King & Co., Bombay, India, | 1900 |
| 325 | Mowat, Dr John, 5 Hope Park Terrace, | 1884 |
| | Munro, Dr J. Ramsay, Sutterton, Boston, | 1901 |
| | Murray, Dr A. Lang, Killara, Sydney, N.S.W., Australia, | 1889 |
| | Murray, Dr D. R., 41 Albany Street, Leith, | 1878 |
| | Murray, Dr James, 1 Brandon Street, | 1879 |
| 330 | Napier, Dr A. D. Leith, 28 Angas Street, Adelaide, South Australia, | 1878 |

| | | Date of Admission. |
|---|---|---|
| | Nicholson, Dr H. Oliphant, 20 Manor Place, | 1900 |
| | Ogden, Dr O. Watson, 38 Jesmond Road, Newcastle-on-Tyne, | 1900 |
| | Ogilvy, Dr Stewart Grant, Fairmont, Fauldhouse, | 1895 |
| | Oliphant, Dr E. H. Lawrence, 23 Newton Place, Glasgow, | 1885 |
| 335 | Orbell, Dr Ronald S., St Giles House, St Giles Street, | 1907 |
| | Orr, Dr John, Heather Lea, Clarendon Road, Eccles, Lancs., | 1887 |
| | Orr, Dr W. Basil, 13 Braid Road, | 1889 |
| | Osler, Dr W. D., 11 Montgomery Street, | 1906 |
| | Paterson, Dr G. Keppie, 19 Albany Street, | 1882 |
| 340 | Paterson, Dr G. W. Simla, 147 Bruntsfield Place, | 1896 |
| | Patton, Dr W. Scott, Capt., I.M.S., "Scotts Burn," Landour, Mussoorie, N.W.P., India, | 1901 |
| | Pearson, Dr C. M., 14 Manor Place, | 1902 |
| | Peddie, Dr H. Anderson, 24 Palmerston Place, | 1882 |
| | Perigal, Dr A., New Barnet, Herts, | 1887 |
| 345 | Pirie, Dr John, | 1888 |
| | Playfair, Dr John, 5 Melville Crescent, | 1873 |
| | Poole, Dr T. D., North Side House, Linthwaite, near Huddersfield, | 1890 |
| | Porritt, Dr E. E., Wanganui, New Zealand, | 1897 |
| | Porteous, Dr J. Lindsay, 83 Warburton Avenue, Yonkers, New York, | 1875 |
| 350 | Porter, Dr Frederick, 65 Morningside Road, | 1904 |
| | Potts, Dr W. A., 118 Hagley Road, Edgbaston, Birmingham, | 1897 |
| | Prentice, Dr W. H., Brunswick Terrace, Brood Street, Pendleton, Manchester, | 1901 |
| | Price, Dr A. W. Gordon, 9 Grange Road, | 1890 |
| | Price, Dr E. F. T., 1 Middleby Street, | 1890 |
| 355 | Primrose, Dr Alex., 100 College Street, Toronto, Canada, | 1887 |
| | Pringle, Dr J. Hogarth, 172 Bath Street, Glasgow, | 1886 |
| | Proudfoot, Dr Thomas, 30 Lauriston Place, | 1884 |
| | Rabagliati, Dr A. H., c/o H. A. Jeffrey, Esq., Solicitor, 13 Cheapside, Bradford, Yorkshire, | 1903 |
| | Raffan, Dr George, | 1907 |
| 360 | Randell, Dr H. St John, Aliwal North, Cape Colony, | 1906 |
| | Reid, Dr H. S., Hessle, East Yorks, | 1907 |
| | Reid, Dr W. L., 7 Royal Crescent W., Glasgow, | 1880 |
| | Rendell, Dr Herbert R., P.O. Box 606, St John's, Newfoundland, | 1882 |
| | Ritchie, Dr James, 22 Charlotte Square, | 1880 |
| 365 | Ritchie, Dr W. T., 9 Atholl Place, | 1899 |
| | Robarts, Dr Henry H., 1 Wemyss Place, Haddington, | 1904 |
| | Roberton, Dr Ernest, Cotele House, Symond Street, Auckland, New Zealand, | 1887 |
| | Roberts, Dr D. Lloyd, 11 St John Street, Manchester, | 1906 |
| | Roberts, Dr Ernest T., Oaklands House, Keighley, | 1890 |
| 370 | Roberts, Dr R. W., Grove Place, Port Talbot, Glamorganshire, | 1894 |
| | Robertson, Dr George, Braehead, Viewfield Place, Dunfermline, | 1901 |
| | Robertson, Dr Robert, 26 Royal Circus, | 1897 |
| | Robertson, Dr W. B., St Anne's, 101 Thurlow Park Road, Dulwich, London, S.E., | 1870 |
| | Robertson, Dr W. G. Aitchison, 2 Mayfield Gardens, | 1889 |
| 375 | Robinson, Dr H. Shapter, Talfourd House, 78 Peckham Road, Camberwell, London, S.E., | 1890 |
| | Ronaldson, Dr T. R., 8 Charlotte Square, | 1877 |
| | Rosa, Dr Albert F., 28 Pitt Street, | 1893 |
| | Ross, Dr T. W. E., 1 Clare Street, Cardiff, | 1904 |
| | Russell, Dr W., 3 Walker Street, | 1890 |

| | | Date of Admission. |
|---|---|---|
| 380 | Saleeby, Dr C. W., 13 Greville Place, St John's Wood, London, N.W., | 1902 |
| | Sandstein, Dr Alfred C., 23 Latimer Square, Christchurch, New Zealand, | 1898 |
| | Saunders, Dr F. A., Grahamstown, Cape Colony, South Africa, | 1885 |
| | Schofield, Dr Linn J., Warrensburg, Mo., U.S.A., | 1893 |
| | Sclater, Dr W. O., Palmer Memorial Hospital, Jarrow-on-Tyne | 1906 |
| 385 | Scott, Dr Alexander, Medical Hall, Broxburn, | 1906 |
| | Scott, Dr T. R., Musselburgh, | 1880 |
| | Secord, Dr E. R., 112 Market St., Brantford, Ontario, Canada, | 1902 |
| | Shaw, Dr C. J., Lunatic Asylum, Gartnavel, Glasgow, | 1903 |
| | Shearer, Dr Alfred, Newtown, N. Wales, | 1898 |
| 390 | Simpson, Dr Archibald, The Hospital, St Michael's Hill, Bristol, | 1906 |
| | Simpson, Dr F. D., 7 Kew Terrace, | 1900 |
| | Slight, Dr J. D., 61 London Road, Leicester, | 1898 |
| | Sloan, Dr Allen T., 22 Abercromby Place, | 1893 |
| | Sloan, Dr S., 5 Somerset Pl., Sauchiehall St. West, Glasgow, | 1887 |
| 395 | Smart, Dr David, 74 Hartington Rd., Sefton Park, Liverpool, | 1882 |
| | Smith, Dr G. H. Walton, Pendower, Oxford St., Paddington, Sydney, Australia, | 1892 |
| | Smith, Dr Gains T., 15 Church Street, Moncton, New Brunswick, Canada, | 1891 |
| | Smith, Dr James, 4 Brunton Place, | 1891 |
| | Smith, Dr John, Brycehall, Kirkcaldy, | 1885 |
| 400 | Smith, Dr W. Ramsay, Central Board of Health, Adelaide, South Australia, | 1892 |
| | Smith, Dr W. Torrance, Linwood, Midcalder, | 1906 |
| | Sneddon, Dr William, Logan Bank, Cupar-Fife, | 1888 |
| | Somerville, Dr C. W., London Mission, Wuchang, by Hankow, Central China, | 1902 |
| | Somerville, Dr James W., 12 Abbotsford Road, Galashiels, | 1902 |
| 405 | Spence, Dr R., St Ninians, Burntisland, | 1878 |
| | Spence, Dr William, Sydney House, Dollar, | 1884 |
| | Stark, Dr J. Nigel, 4 Newton Place, Charing Cross, Glasgow, | 1908 |
| | Stephen, Dr W. A., Loftus-in-Cleveland, Yorkshire, | 1894 |
| | Stephenson, Professor Wm., 3 Rubislaw Terrace, Aberdeen | 1861 |
| 410 | Stevens, Dr John, 78 Polwarth Terrace, | 1894 |
| | Stewart, Dr A. D., 8 Brougham Place, | 1906 |
| | Stewart, Dr J. S., 15 Merchiston Place, | 1884 |
| | Stewart, Dr R., 25 George Square, | 1885 |
| | Stirling, Dr R., 4 Atholl Place, Perth, | 1892 |
| 415 | Story, Dr B. S., Wellington, New Zealand, | 1898 |
| | Strain, Dr Arthur C., Lathland House, West Hartlepool, | 1904 |
| | Stumbles, Dr H. M., Amble House, Amble, Northumberland, | 1903 |
| | Sturrock, Dr J. F., Arima, Broughty-Ferry, | 1887 |
| | Sullivan, Dr John, 34 Gilmore Place, | 1902 |
| 420 | Tannahill, Dr W. B., 40 Margaret Street, Greenock | 1907 |
| | Taylor, Dr David R., St Helen's, Ayton, | 1896 |
| | Taylor, Dr William, 12 Melville Street, | 1868 |
| | Taylor, Dr W. Macrae, 8 Melville Street, | 1895 |
| | Teacher, Dr C., Craigend, North Berwick, | 1887 |
| 425 | Temple, Dr G. H., Ailanthus, Weston-super-Mare, | 1888 |
| | Tennant, Dr John, Scunthorpe, near Doncaster, | 1902 |
| | Thatcher, Dr C. H., 8 Melville Crescent, | 1877 |
| | Thin, Dr Robert, 25 Abercromby Place, | 1891 |
| | Thomas, Dr G. Crewdson, 34 West Hill, Sydenham, London, S.E., | 1899 |

| | | Date of Admission. |
|---|---|---|
| 430 | Thompson, Dr F. E., 20 Park Avenue, Montreal, Canada, . | 1902 |
| | Thompson, Dr Herbert P., St James's Lodge, Crowland, Peterborough, . . . . . . . | 1906 |
| | Thompson, Dr James L., Castlemaine, Victoria, Australia, . | 1894 |
| | Thomson, Dr A. D. R., 19 Bridge Street, Musselburgh, . | 1877 |
| | Thomson, Dr John, 14 Coates Crescent, . . . | 1887 |
| 435 | Thomson, Dr J. Stitt, Castle Hill House, Lincoln, . . | 1877 |
| | Thomson, Dr T. J., 31 Morningside Road, . . . | 1902 |
| | Thyne, Dr T. J., 16 Randolph Crescent, . . . | 1887 |
| | Tod, Dr John, 69 Ferry Road, Leith, . . . . | 1892 |
| | Tristan, Dr R. J., 28 Carolgate Retford, Notts, . . | 1887 |
| 440 | Underhill, Dr T. Edgar, Dunedin, Barnt Green, Worcestershire, | 1879 |
| | Vassie, Dr Alexander H., 98 Priory Road, West Hampstead, London, N.W., . . . . | 1891 |
| | Venters, Dr Isabel, 6 Archibald Place, . . . | 1907 |
| | Vickery, Dr W. H., 1 Trewartha Park, Weston-super-Mare, . | 1892 |
| | Wade, Dr George, St John's, Melrose, . . . . | 1893 |
| 445 | Walker, Dr Arthur S., Ashleigh, Middlesborough, . . | 1906 |
| | Wall, Dr A. Percy, . . . . . . . | 1907 |
| | Wallace, Dr Abraham, 39 Harley Street, London, W., . | 1879 |
| | Wallace, Dr R. W. L., Pourie House, Turriff, . . | 1905 |
| | Watson, Dr B. P., 6 Castle Terrace, . . . . | 1902 |
| 450 | Watson, Dr R. H., Trereiffe, Roche, R.S.O., Cornwall, . | 1896 |
| | Waugh, Dr John, 36 Finsbury Pavement, London, E.C., . | 1881 |
| | Webster, Dr A. D., 18 Minto Street, . . . . | 1881 |
| | Webster, Prof. J. C., 706 Reliance Building, 100 State Street, Chicago, U.S.A., . . . . . . . | 1889 |
| | White, Dr A. L., Bishopyards, Penrith, . . . | 1903 |
| 455 | Wilcockson, Dr G. Morton, 26 Wheathouse Road, Huddersfield, | 1893 |
| | Wilkie, Dr James, Selville House, Portobello, . . . | 1897 |
| | Wilkinson, Dr George, 3 Dingle Hill, Liverpool, S., . . | 1889 |
| | Will, Dr J. C. Ogilvie, 17 Bon-Accord Square, Aberdeen, . | 1867 |
| | Williams, Dr J. T., Llwynypia, Rhondda Valley, Glamorganshire, . . . . . . . . | 1904 |
| 460 | Willcox, Dr F. Mayes, 8 Strathearn Road, . . . | 1902 |
| | Wilson, Dr James, 53 Inverleith Row, . . . . | 1889 |
| | Wise, Dr Robert, 290 Ivydale Road, Nunhead, London, S.E., | 1890 |
| | Wood, Dr Thomas, 182 Ferry Road, . . . . | 1886 |
| | Woodside, Dr J. T., Stewartstown, Co. Tyrone, . . | 1898 |
| 465 | Wright, Dr W. F., . . . . . . . | 1887 |
| | Yoe, Dr Richard T., 2103 Floyd Street, Louisville, Kentucky, U.S.A., . . . . . . . . | 1891 |
| | Young, Dr H. C. Taylor, 221 Macquarrie Street, Sydney, New South Wales, . . . . . . | 1900 |
| | Young, Dr James, 4 Torphichen Street, . . . | 1907 |
| 469 | Young, Dr Peter A., 25 Manor Place, . . . . | 1871 |

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# THE TRANSACTIONS

OF THE

# EDINBURGH OBSTETRICAL SOCIETY

# TRANSACTIONS
OF THE
# EDINBURGH OBSTETRICAL SOCIETY,
## FOR SESSION LXIX., 1907–1908.

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### Meeting I.—November 13, 1907.

Dr J. W. Ballantyne, *President, in the Chair.*

I. *The Treasurer* (*Dr Wm. Craig*) made his Annual Statement, which is given below:—

INCOME.

| | | |
|---|---|---|
| Balance from Session 1905-1906, | | £563 7 5 |
| Arrears, | £7 15 0 | |
| Bank Interest on Deposit Receipts, | 12 5 4 | |
| Interest on Consols, | 6 0 8 | |
| Entrance Fees from 24 new Ordinary Fellows, | 25 4 0 | |
| Annual Contributions from 376 Ordinary Fellows, | 94 0 0 | |
| Annual Contribution from 1 Ordinary Fellow, | 0 1 0 | |
| Composition for Life-Membership from Five Ordinary Fellows, | 26 5 0 | |
| *Transactions* sold, | 5 7 0 | |
| | | 176 18 0 |
| | | £740 5 5 |

EXPENDITURE.

| | | |
|---|---|---|
| Bank Cheque Book, | £0 2 6 | |
| Corporation Duty, | 0 15 7 | |
| Income Tax, | 0 4 6 | |
| Shorthand Reporters, | 7 7 0 | |
| Commission to Collector, | 1 11 0 | |
| Doorkeeper's Salary, | 1 12 0 | |
| Oliver & Boyd's Account for Vol. XXXII. of Society's *Transactions* (562 copies), | 106 5 8 | |
| Oliver & Boyd's Account for Printing Billets, Postages, etc., | 24 17 0 | |
| Rent of Rooms and Carriage of Books, | 4 10 0 | |
| Waterston & Sons' Account, | 3 5 10 | |
| The Secretaries and Editor, for Postages, | 0 6 6 | |
| Blocks for Illustrations, | 6 2 0 | |
| | | £156 19 7 |
| Balance to New Account,[1] | | 583 5 10 |
| | | £740 5 5 |

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[1] Of this Balance, the sum of £250, 10s. 6d. is invested in 2½ per cent. Consols.

The accounts were audited by *Dr James Ritchie* and *Dr Keppie Paterson,* and found correct. It was suggested that a further sum might be invested in some trust security. This matter was referred to the Council.

*Sir Alexander R. Simpson* moved a hearty vote of thanks to the Treasurer, which was unanimously accorded.

II. The following lady and gentlemen were elected Ordinary Fellows of the Society:—Angus Buchanan, M.B., Ch.B., 48 Bruntsfield Gardens, Edinburgh; W. B. Tannahill, M.B., Ch.B., 40 Margaret Street, Greenock; David Lees, M.A., M.B., Ch.B., Lagg, Ayr; A. Middleton Hewat, M.B., Ch.B., 19 Great Stuart Street, Edinburgh; Miss Isabel Venters, M.B., Ch.B., 6 Archibald Place, Edinburgh; G. H. Lloyd Fitzwilliams, M.B., Ch.B., F.R.C.S., Cilgwyn, Newcastle-Emlyn.

III. The Society then proceeded to the election of Office-bearers for the present Session, and the President announced the result as follows:—*President,* Professor Stephenson (Aberdeen); *Vice-Presidents* (*Senior*), Dr Wm. Fordyce; (*Junior*), Dr F. W. N. Haultain; *Treasurer,* Dr Wm. Craig; *Secretaries,* Dr Barbour Simpson and Dr Angus Macdonald; *Librarian,* Dr F. W. N. Haultain; *Editor of Transactions,* Dr Macrae Taylor; *Members of Council,* Sir Halliday Croom, Dr Samuel Sloan (Glasgow), Mr Scott Carmichael, Dr J. W. Ballantyne, Dr Lamond Lackie, Dr D. J. Graham, Dr A. T. Sloan, Dr Ranken Lyle (Newcastle).

IV. *The President* (*Dr J. W. Ballantyne*) delivered his Valedictory Address, as follows, dealing specially with

## HOSPITAL TREATMENT OF MORBID PREGNANCIES.

Ladies and Gentlemen, Fellows of the Edinburgh Obstetrical Society,—When a man has crossed the meridian of life the word farewell begins to associate itself more and more with his further progress. When he has overpast by more than a decade of years the summit of the arch of life—"*Il punto sommo di questo Arco,*" as Dante calls it—and when his hair begins to be whitened with the dust of the way, valedictories and leave-takings come to be more and more his lot. In youth he counts with impatience the milestones of the road and rejoices as their numbers grow, pushing on into manhood; but when he has seen five-and-forty of them go past, the later ones with an ever-increasing rapidity, he cannot fail to speculate whether there are to be twenty more or ten or two. When also the troop of eager runners who paced beside him in the early years dwindles into the easily counted band of travellers who now descend the hill in his company, he realises, not without pain, how quickly the days of work have gone by and how little he has accomplished in them.

"Slow goes the time
The while the fresh dew-sprinkled hill we climb,
Thinking of what shall be the other side;
Slow pass perchance the minutes we abide
On the gained summit, blinking at the sun;
But when the downward journey is begun
No more our feet may loiter."

But the obstetrician cannot long remain a pessimist; he dwells so much among the springs of life that he is not greatly oppressed by the approach of death, and he reflects that some at least of the new lives he has ushered into the world may bring to mankind new sources of happiness, may increase its stores of knowledge, and may, perchance, adorn with fresh lustre the profession of medicine itself. So he takes courage again, and speaks his *Vale* without faltering.

During the two years which have elapsed since you did me the high honour, the highly appreciated honour, of placing me in the Presidential Chair of the Edinburgh Obstetrical Society

—the Chair which has been occupied by Beilby, by Sir James Y. Simpson, by John Moir, by Matthews Duncan, by Angus Macdonald, and by Sir Alexander Simpson, not to name other good men and true—during these two years four of our Honorary Fellows have been taken from us by death: Gusserow and Pasquali, and Budin and Barnes.

### ADOLF GUSSEROW.

Early in February 1906 I received from Berlin the tidings of the decease of Gusserow. "Heute früh entschlief sanft im siebsigten Lebensjahre mein geliebter Mann, unser guter Vater, der Geheime Medizinalrath Professor Dr Adolf Gusserow," ran the letter which was signed by his widow and his three daughters, and was dated 6th February. Thus Gusserow had passed away in the town which also witnessed his birth. When I visited Germany in the spring of 1885 I carried with me letters of introduction to each member of the Triumvirate, which then ruled over matters obstetrical in the German capital. I was thus enabled to see some of the work of August Martin and of Carl Ludwig Ernst Schroeder, from both of whom I also received much kindness; but for some cause or other (I forget now what) I failed to make the acquaintance of Adolf Gusserow, the third member of this trio of brilliant obstetricians and gynæcologists, and the loss I then sustained was never made good. It was a loss, for Gusserow had a strong attachment to Edinburgh and to Edinburgh obstetrics, born of his visit to Great Britian in 1864 and of the friendship then established between Sir James Y. Simpson and himself, and so delightfully described in his address entitled "Zur Erinnerung an Sir James Y. Simpson," given in 1871, when Gusserow was rector of the University of Zürich.

Gusserow was born in Berlin in 1836, and his father was a medical man there. He studied in his native town as well as in

Prague and Wurzburg, and, after graduation, he became assistant in Eduard Martin's obstetrical clinic. In 1863-4 he travelled in Great Britain and France and gained experience, especially in regard to the then novel operation of ovariotomy. In 1864 he served in the army; and in the same year he gave an account of his foreign travels, under the title of "Geburtshülfe und Gynäkologie in Grossbritannien." He settled in Berlin, but was soon called to Utrecht; and no sooner had he commenced his teaching there than he was appointed to the University of Zürich as successor to Breslau. He went to Zürich in 1867, where he had to contend with many difficulties, such as the small amount of clinical material and the unsatisfactory state of the Lying-in Hospital. But he overcame these difficulties and soon saw himself elected to the honourable place of Rector of the University. As Rector he required no small amount of tact, for these were the days of the Franco-Prussian War, and the sympathies of the townspeople of Zürich went to the French; but the young official rose to the occasion, and, as Wyder puts it, "Mit grossem Geschicke wusste Gusserow die Gemüter hüben und drüben zu beruhigen." Gusserow was next sent to Strassburg (in 1872), where again he had to do much in the way of organising and building up; thither he was accompanied by his assistant, P. Zweifel. Finally, in 1878, he was called to Berlin to the obstetrico-gynæcological Klinik of the Charité, then newly founded and still in a chaotic state; he was accompanied by another distinguished assistant, Max Runge. There the rest of his life-work was accomplished, there he married Clara Oppenheim, and there he died in February 1906, about two years after his resignation of his Professorship.

Gusserow was not so voluminous a writer as some of his contemporaries; but he made several notable contributions to the literature of his specialty, and his work on *Die Neubildungen des Uterus* may be singled out as of special importance. It first appeared in 1878 as a section of Bilroth's *Handbuch der Frauen-*

*krankheiten*, and was republished in 1886 as the fifty-seventh Lieferung of the *Deutsche Chirurgie;* it was translated into English by Wendt, and published in New York in 1887 as a part of Volume IX. of the *Cyclopædia of Obstetrics and Gynæcology.* Gusserow was also co-editor of the *Zeitschrift für Geburtshülfe und Gynäkologie* and a collaborator for the *Archiv für Gynaekologie.* He was a brilliant clinical teacher, endowed with powers of clear exposition and with a constant flow of humour. Some of his *bon-mots* were current in Zürich forty years after they were made, says Wyder. If he was not so famous as a gynæcological operator, that was to be accounted for by the fact that the technique of that subject was only being elaborated when Gusserow was young. In the Examination Hall he was much feared; but, concludes Wyder (in his appreciation in the *Monatsschrift für Geburtshülfe und Gynäkologie*, XIII., 524), he was "ein vollendeter Gentleman."

## ERCOLE PASQUALI.

It was in 1899, during the second Presidentship of Sir Halliday Croom, that our Society honoured itself by electing Professor Ercole Pasquali as one of its Honorary Fellows. For fully seven years he held our fellowship, and then passed away in January 1906, at the ripe age of eighty years. Up to the end he gave freely of his strength and time to the school of obstetrics with which he had all his life been connected and at the head of which he stood for thirty years. He was Professor of Obstetrics and Gynæcology in the University of Rome.

Pasquali began his obstetric teaching in the Clinic instituted by Pope Pius IX. in 1865, and in 1875 he was put in charge of the clinical work in the same Clinic, and acted first as extraordinary and then as ordinary professor; he succeeded Panunzi. Here during many years he accumulated the vast mass of notes of obstetric cases, bound up in large volumes, which constitute the record of his life-work, and which may yet serve as a mine of information from which his pupils and successors may draw wisdom and experience. There in these unpublished volumes lie the records of 35,000 midwifery cases, all conducted under his care or supervision. Micheli, who has explored these volumes, tells us, in his obituary notice of Pasquali, that they contain a rich store of information bearing on the deformed pelvis, on premature labour, on the mode of action and use of the forceps, on manual dilatation of the cervix in labour, on the use of veratrum viride in eclampsia, on the auto-intoxications of pregnancy, and on rachiotomy in cases of the aftercoming head. From this accumulated experience Pasquali drew, when he laid before Italian obstetrical societies and international medical congresses his contribution to the discussion of such problems as the best method of performing the Cæsarean section, the technique of abdominal hysteropexy, the management of pregnancy complicated by the presence of fibroid tumours, and the treatment of retroversion of the gravid uterus. Pasquali was also a member of the body of collaborators who presided over the fortunes of both the leading Italian journals devoted to his specialty—the *Annali di ostetricia e ginecologia* and the *Archivio di ostetricia e ginecologia.*

## ROBERT BARNES.

The Fellows of this Society who were present at the conjoint meeting with the sister society of Glasgow on July 9, 1902, will remember that the "Nestor of British Midwifery," as Professor (now Sir Alexander) Simpson called him, took part in the discussion and sat down with us at the dinner which followed. The subject of debate was "Hæmorrhage during the Later Months of Pregnancy and Early Stages of Labour," and Professor Jardine of Glasgow ably opened the discussion. He was followed by Dr Robert Barnes, whose words I here reproduce: he said that he was no longer up-to-date, but behind the time in many points, but that, generally speaking, he agreed with what Dr Jardine had said about the treatment of placenta prævia. There was no point he wished specially to dwell upon, but he had great faith in the elastic uterine dilator he had contrived. It was a most effective instrument, if used at the right time. In the treatment afterwards, the injection of hot water was extremely useful. The mode of abdominal compression was also of value, and if all these methods were used together the bleeding could usually be controlled. He heartily agreed in the treatment by turning and pulling a leg down—the child's body or buttock formed an excellent plug, and exerted pressure on the wall of the uterus. It afforded him intense pleasure in his retirement to come and see this gathering of old and new friends uniting in harmony of work. Dr Barnes's words were memorable as embodying the long experience of a Master of the Art; and, as Professor Simpson said, the younger Fellows of the Society might well be proud of being present at this meeting, and of being able to tell to another generation that they had heard Dr Barnes speak to them of his experience.

Dr Barnes was then eighty-five years of age, having been born in 1817, and he lived till he had attained his ninetieth year, dying on May 12, 1907. He first saw the light in Norwich, the scene of the activities of another famous physician, Sir Thomas Browne, and his father was Philip Barnes, founder of the Royal Botanic Society of London. A great part of his schooling he got at Bruges, and the command which he thus early acquired over the French language afterwards stood him in good stead at many an international congress of medicine and obstetrics, and especially at that of gynæcology at Geneva in 1896. When fifteen years old he was apprenticed to Richard Griffin, surgeon to the Old Man's Hospital, Norwich; he next proceeded to London, and after study at University College graduated M.D.Lond. in 1848. Eleven years later he became a

Fellow of the Royal College of Physicians of London, and in 1883 he was made a Fellow of the sister College, by election. He was elected an Honorary Fellow of the Royal College of Physicians of Ireland in 1887, and he also held the Fellowship of the Royal Geographical and Linnæan Societies. He first practised at Notting Hill, and after holding some small appointments which served to develop his liking for obstetric teaching, he was elected Assistant Obstetric Physician at the London Hospital, where, at a later date, he followed Ramsbotham in the senior post. We afterwards find him at St Thomas's Hospital, and, later still, at St George's. In December 1858 Dr Barnes took an active part in the founding of the Obstetrical Society of London. In moving the second resolution—"That all legally qualified medical practitioners shall be eligible for election as ordinary Fellows of the Society"—he hailed with satisfaction the establishment of a society in the metropolis for the cultivation of obstetrics. It must long have appeared singular that obstetric societies should exist in Dublin, Edinburgh, and Berlin, where obstetric experience must be very small compared with that of London, whilst there was no such society in London. It was, he believed, "time to vindicate the honour of the great London school of midwifery." Sir Charles Locock, Bart., was the Honorary President of the newly formed society, Edward Rigby was the President, and first in the long list of Vice-Presidents stands the name of Robert Barnes. Barnes was also a constant contributor to the *Transactions* of the Society which he thus helped to found. Changes come in the course of years; the Obstetrical Society of London was founded in December 1858, and in December 1884 we find Barnes again moving a resolution, on this occasion to the effect that "a Gynæcological Society be now founded, to be called the British Gynæcological Society." In taking this action Barnes had the sympathy of the younger obstetric physicians, who did not wish to see such operations as ovariotomy pass into the hands of the surgeon, and he led them to victory. But, once more, the progress of time has wrought changes, and we now hear of the reunion of the sundered societies in the larger combination to be known as the *Royal Society of Medicine of London;* but Barnes himself did not live to see it consummated.

Barnes was the author of at least two great books—*Lectures on Obstetric Operations* (several editions of which have appeared in this country and the United States, the first in 1870), and his *Clinical History of the Medical and Surgical Diseases of Women* (1873). His *System of Obstetric Medicine and Surgery,* written in collaboration with his son, Dr Robert Sydenham Fancourt Barnes, just missed being a great book. Of his numerous smaller contributions to the literature of his subject special mention must be made of the famous Lettsomian Lectures on the *Physiology and Treatment of Placenta Prævia,* of his article on the so-called *Missed Labour,* of his paper on the *Mechanism of Labour* (in which the curve of the false promontory, often called Barnes's curve, was fully considered), and of his contribution to the *Treatment of Hæmorrhage after Labour,* in which he made the recommendation to inject perchloride of iron into the uterus, a procedure now, I fancy, little practised. To the younger medical men of the present day Barnes will be best known probably as the inventor of the water-bags or hydrostatic dilators, often called Barnes's Bags; but the claim to priority of invention in this matter was not allowed to go unchallenged, and those of us who heard the late Dr Alexander Keiller make his claim to have been the first to use and to propose to the profession to use an india-rubber bag for dilating the cervix uteri will recollect that he made out a good case for himself. But the echoes of that controversy have long since died away, and no word to suggest that it had ever taken place fell from Dr Barnes's lips when he visited us and spoke at our summer meeting in 1902.

## PIERRE BUDIN.

Born in 1846, Budin was only sixty-one when he succumbed to pneumonia in January 1907. His death took place at Marseilles, whither he had gone to attend a Conference on the subject of the Prevention of Infantile Mortality, a matter so near his heart that he dictated on his deathbed a letter to his friends and pupils beseeching them to continue his efforts to diminish the appalling mortality amongst new-born infants. "Mes chers amis," he wrote, "Je vous confie le sort des petits enfants de France. Je compte sur vous pour faire par vous-même d'abord et plus tard par vos élèves la propagande nécessaire en faveur de consultations des nourrissons." It was the great enthusiasm of his life, this struggle against the wastage of young life, and he gave to it all his thought, all his knowledge, all his strength, nay, in the end, his life itself. It is a grand thing for a man when he finds in his day's work a wrong that requires to be righted, when he comes face to face with a state of things so deplorable that all that is highest and best in him rises up in revolt and calls aloud for reform, for revolution, for a new departure, for the destruction of the old and bad, for the introduction of the new and good. It was so for Budin when he began to realise how many infants were perishing in France, not so much by reason of the virulence of disease as in consequence of the amazing ignorance of the laws of infantile health which everywhere prevailed. "Where is the child who was born here a year ago?" he would say to an expectant mother at the hospital. "Il est mort," was the far too frequent reply she would make. The time had come for a new crusade, the great twentieth-century crusade, against infantile mortality, "la ligue contre la mortalité infantile." Budin was its heaven-sent leader, and before his death he had heard the first clarion notes of victory.

Pierre Budin was born at Enancourt-le-Sec, in the ancient district of the Vexin; he began his medical studies in 1867, was externe of the hospitals in 1869 and interne in 1872, and he received his doctorate in 1876. The subject of his thesis was *De la tête du fœtus au point de vue de l'obstétrique;* but he had already published a research on *La ligature du cordon ombilical* (in 1875); in 1877 he translated from English into French Matthews Duncan's article *Sur le mécanisme de l'accouchement normal et pathologique*, and in 1878 he wrote *Des lésions traumatiques chez la femme dans les accouchements artificiels*—a wonderful record of literary and scientific activity. In 1875 he had worked with Tarnier, and had begun that association with him which was in the future to influence so profoundly his whole career, and in 1878 he became *chef de clinique* with Professor Depaul. He wrote the prefatory note to the translation of our own Hart and Barbour's *Manual of Gynæcology* in 1886. In 1880 he became Professeur agrégé à la Faculté de Médecine, and in 1882 he began his work as accoucheur at la Charité, and there in 1892 he founded the first *consultation des nourrissons*, and so inaugurated that campaign against maternal ignorance which was to have such far-reaching effects upon the hygiene of the young infant all over the world. Meanwhile, in 1889, Budin had been elected a member of the Académie de Médecine. In 1895 he went to the Maternité, which he left only in 1898, when called to fill the chair of Tarnier, and to take his place at the Clinique in the *rue d'Assas.* In 1902 he founded, in association with Strauss and under the patronage of the philanthropic Roussel, the *Ligue contre la mortalité infantile,* to which reference has already been made.

In addition to the works which I have named, Budin was one of the founders of *Le Progrès Médical,* he was the founder and the editor in chief of *L'Obstétrique,* and he collaborated with Tarnier in the monumental *Traité de l'art des Accouchements* which appeared at intervals between the years 1881 and 1901, and filled four large volumes. Perhaps the work by which, however, Budin will be best known by future generations of obstetricians is his *Nourrisson*, published in 1900; this book, which contains a summary of all he was enabled to do for the welfare of the new-born infant and for the encouragement of maternal nursing, has been recently translated into English by a Fellow of this Society, and provided with an appreciative introduction from the pen of Sir Alexander Simpson. To give even the titles of his other works would occupy a considerable amount of space, but I cannot pass from the consideration of Budin's life and work without rendering a tribute to the wonderful charm of manner and radiant personality he showed and possessed. I had the pleasure of his personal acquaintance, and I have very happy recollections of conversations with him on the subject of the new-born infant and of the possibilities of the hygiene of the child. He was devoted to the service of the young child, and his sympathy flowed over from the department of the new-born infant into the neighbouring field of the unborn babe. Pierre Constant Budin began his professional career as an obstetrician in Paris; at its close he was recognised everywhere as a philanthropist, as a social reformer, as the resolute opponent of neo-Malthusianism, and as the saviour, directly and indirectly, of countless young lives. So he was "puro e disposto a salire alle stelle."

## CORRESPONDING FELLOWS.

The list of Corresponding Fellows has been made poorer by the deaths of Alexander Peddie, Thomas Skinner, Francis Robertson Macdonald, Andrew Scott Myrtle, and Alexander Thom.

When our Society celebrated its Jubilee in December 1889, its President was able to congratulate it on the presence in its midst of six of the twenty original members—namely, Dr John

Moir, Dr Charles Bell, Dr George Paterson, Dr Peddie, Dr Malcolm, and Dr Graham Weir. Gradually the ranks of this little band have thinned, and in January 1907 *Dr Alexander Peddie* passed to his rest; but it is a remarkable fact that, sixty-seven years after its foundation, the Edinburgh Obstetrical Society could still show on its list of Fellows the name of one of its Founders.

Dr Peddie was born in George Square, Edinburgh, in June 1810; he was a son of the manse, his father being the Rev. James Peddie of the United Associate Church, Bristo Street. He was educated first at Mr Lennie's school, then at the Royal High School, and then at the University, but four years (they must have been very wearisome to Peddie) in a bank intervened between his school and his University days. At the High School he had among his comrades some boys who were to be famous men—Lord President Inglis, Lord Moncreiff, William Blackwood, and Douglas Maclagan—and there is to me a personal note of interest in this matter, for my mother's father must have been passing through the classes at the same time. Alexander Peddie and John Brown, author of *Rab and His Friends*, were fellow-apprentices with Syme in Minto House before the latter fought his way (in 1833) into the Royal Infirmary. Two years later Peddie became a Licentiate of the Royal College of Surgeons, and graduated as M.D. at the University of Edinburgh; he then went to Paris, the Mecca of the young medical man of those days, and brought back with him Laennec's stethoscope; and in 1845 he was elected a Fellow of the Royal College of Physicians, the Presidential Chair of which he filled in 1878-9. In December 1839 he was busy, as we have seen, with the founding of our own Society, and he married in 1844 the eldest daughter of Dr Thomas Anderson of Selkirk; he lived to see the Jubilee of the Society, and had his wife lived a few months longer they would have been able to have celebrated their diamond wedding; as it was, they had their golden wedding in 1894. Dr Peddie was associated in his long life with not a few of the notable advances in medical practice which Edinburgh saw. It was during his term of management of the old Minto House that that institution became self-supporting; he was by his writings and advocacy one of the originators of the Royal Hospital for Sick Children; he was a pioneer in the agitation for the legislative control of habitual drunkards; he was one of the originators of the Edinburgh Dental Hospital and School; he represented the Royal College of Physicians at the opening of the new Royal Infirmary and of the new Royal Maternity and Simpson Memorial Hospital; and he was one of the first to give a series of popular Health Lectures in Edinburgh and the neighbourhood. Further, in 1845, he made a most important contribution to the literature of obstetrics, which appeared in the *Edinburgh Medical and Surgical Journal* for 1846, under the title of "*Cases illustrative of the contagious nature of Puerperal Fever and its intimate connection with Erysipelatous and Phlebitic Inflammations.*" About this work the writer of an eloquent obituary notice of Dr Peddie in the *British Medical Journal* (February 2, 1907) says: "This paper, showing as it did the urgent necessity for careful obstetric precautions, was greatly in advance of the times in regard to infectious (afterwards called septic) action, and was, as far as this country is concerned, the first contribution to this important department of medical practice. It is true, of course, that Oliver Wendell Holmes had published his paper on this subject in 1843, but, as literature was not so quickly diffused in those days, Peddie certainly did not know of the existence of the earlier paper when he wrote his. None the less, then, does he deserve an honourable niche in the temple of fame, and to be mentioned along with Oliver Wendell Holmes and Semmelweis, whose paper was not published till 1847."

Dr Peddie made other contributions to literature, among which perhaps the best known and most generally interesting are the Harveian oration on "*Dr John Brown, his Life and Work*," and "*Recollections of Dr John Brown, with a Selection from his Correspondence*." He wrote, also, on *Cases of Dropsy and Gangrene occurring in a family who had subsisted for some time on unwholesome potatoes*, on *Cases of poisoning by Fungi*, on *spinal Apoplexy*, on *The Mammary Secretion and its Pathological Changes*, on *The Pathology of Delirium Tremens*, and on *Dipsomania*.

I cannot conclude this very imperfect sketch of Dr Peddie in a more fitting manner than by quoting some sentences from the able obituary notice, evidently from the pen of one who knew him well, which appeared in the *British Medical Journal* last February. "A man who had lived so long that he could recall the illumination of Edinburgh at the time of the entry of the allied armies into Paris in 1814, after the battle of Leyden; a man who had seen Scott, Jeffrey, Cockburn, and Christopher North walking the streets of Edinburgh; a man who had seen in 1822, from a stand erected at the head of the Lawnmarket for the High School boys, the Royal procession on the occasion of the visit of George IV. to Edinburgh; a man who had been the pupil of Knox, of Burke and Hare notoriety; a man who had been the personal friend of Christison, Hughes Burnett, John Brown, William Fergusson, James Begbie, Syme, Lister, and Douglas Maclagan; a man who lived during the reigns of five English Sovereigns—George III., George IV., William IV., Victoria, and Edward VII.—was of necessity a most interesting personality from the merely historic point of view. But Alexander Peddie was more than that. While he was dominated by a very retiring nature he was ultimus Romanorum. Like his friend Christison, he had a dignified presence and mien and the same innate refinement. In his presence one felt the intense kindness and human sympathy of the man, one felt that he moved on a higher ethical plane, one felt better and a truer man in his presence. He was the last of his kind and of the remarkable group among whom he lived his professional life and had his being, and all of whom he outlived." It may be added that Dr Peddie was a keen salmon-fisher, a skilled musician, a Liberal in politics, and a warm supporter of the United Free Church, into which he had come from the Secession *via* the United Presbyterian Church.

*Dr Thomas Skinner*, who joined the Edinburgh Obstetrical Society in 1856, died in London on 11th September 1906, at the age of eighty-one. He was an L.R.C.S. of Edinburgh of 1853, and an M.D. of St Andrews of 1857. He practised in Liverpool till 1880, and he was the author of articles on *Chloroform as an Anæsthetic in Natural Labour*, on *Uterine Fibroid Tumours*, etc. He was co-editor of the *Organon*, Liverpool.

*Dr Francis Robertson Macdonald* of Inveraray was an M.D. of Edinburgh of 1853. He died on 2nd January 1907. He was a descendant of the MacIans, chiefs of Glencoe. He settled in Inveraray about fifty years ago, and became medical attendant to the late Duchess of Argyll. He was the author of an article on *Chloroform in Labour*, and he was a J.P. and an Hon. Sheriff-Substitute of Argyllshire.

*Dr Andrew Scott Myrtle* of Harrogate joined our Society in the same year (1859) that witnessed the election of Dr Robertson Macdonald. It was at this time, also, that the members of our Society had bestowed upon them the name of Fellows. Dr Myrtle died on the 29th of March of this year, at the age of eighty-two, having been for nearly fifty years a well-known figure in the Yorkshire spa town, whose fame he did so much both to make and to maintain. He graduated M.D. of Edinburgh in 1844, having been apprenticed for five years to his brother, who was an Edinburgh doctor. In 1847 he helped to fight the epidemic of typhus fever then raging in Edinburgh, and, like Dr Peddie on a similar occasion, he was himself attacked by the disease. He was then for a year or two in practice in Polmont, going thence to take up his life's work at Harrogate. His works on *Chronic Diseases best fitted for Treatment by the Harrogate Mineral Springs* (1876) and on *Harrogate and its Waters* (1885), as well as the book entitled *Practical Observations on the Harrogate Mineral Waters* (written in conjunction with his son, Dr James Aitken Myrtle), had no little share in attracting visitors to the West Riding. Dr Myrtle wrote also on *Gout, Eczema, Psoriasis, Neurasthenia,* etc. He was a J.P., and a member of various medical societies.

Although *Dr Alexander Thom* died in Edinburgh on 16th January 1906, he was best known as Dr Thom of Crieff, for it was in that town that he spent nearly twenty years of life in a large and important practice. He was an M.A. of St Andrews of 1873, and an M.D. of Edinburgh; and during his student career he was distinguished alike in his classes and in athletics. He was a hard worker always, took inadequate holidays, and paid the penalty, perhaps, in a breakdown which led to his death at the comparatively early age of fifty-two.

## ORDINARY FELLOWS.

The losses the Society has received during the past two years by deaths in the list of the Ordinary Fellows have been very great; no less than thirteen of our number have thus been taken from us, including Dr Robert Lucas of Dalkeith and Dr James Jamieson of George Square, whose obituaries were penned by my predecessor in office.

*Dr Andrew M'Lennan Thomson Rattray* joined our Society in 1869; he studied at the University of Edinburgh, and graduated as M.D. in 1862; and he died after a short illness on 18th September 1906. He was Portobello's oldest medical practitioner at the time of his decease, and he was much interested in her affairs, serving for some time on her School Board. He was a frequent contributor to the early volumes of the *Transactions* of our Society; thus, in Volume II. we find two articles from his pen, one on a specimen of *hydatigenous ovum* and another on a case of *phlegmonous inflammation of the left labium and abscess,* while he showed five specimens, including a *large placenta,* a *melanotic tumour,* a *short cord,* a *urethral calculus,* and a *gall-bladder with gall-stones.* He was always ready to take his part in discussions on subjects which interested the general practitioner, and I find that he spoke on Dr Buist's paper, entitled *The Art of Vaccination,* in May 1901. Of late years Dr Rattray was not so often seen at our meetings, but a proposal to admit women to the Fellowship or to change the hour of meeting brought him out. He is survived by a widow, by one daughter, and by three sons, two of whom are members of the profession which their father adorned. He was much interested in the attempt to check cigarette-smoking among the young.

*Dr Thomas Hardie* of Leith was an M.D. of Edinburgh of 1858, and he was elected a Fellow of the Royal College of Physicians in 1868; he joined our Society in 1870. He acted as house surgeon under Gillespie and as house physician under Laycock in the old Infirmary, and, after settling in Leith, he was for thirty years one of the visiting physicians of its hospital. After a long illness he died on 28th February 1906, in his sixty-ninth year, being at the time of his decease the oldest medical practitioner in Leith.

*Dr James Dunsmure* joined this Society in 1876, and he died from heart failure during what seemed to be the recovery period after an operation on 15th July of this year. It is difficult for us to realise that he has passed from us, and it seems as if it were only yesterday that I was examining with him for the Triple Qualification of the Colleges. He was born in 1846, his father being one of the surgeons of the Royal Infirmary and a President of the Royal College of Surgeons. He took the licence of the College in 1867, he graduated as M.B. at the University in the same year and as M.D. in 1870; he was admitted a Fellow of the College in 1871, and in 1901 he was raised to the Presidential Chair, which his father had occupied before him. It was during his presidency that the preparations for the Quatercentenary celebrations were carried through which had so much to do with the great success of that brilliant function, and Dunsmure himself was the heart and soul of them all. Everyone rejoiced when the University of Glasgow conferred upon him its Degree of LL.D. But these things came to Dunsmure near the close of his life. After his graduation he proceeded to the Continent, where he studied at Berlin, Prague, and Vienna. On his return to Edinburgh he began to assist his father in his practice, and he became one of the physicians to the New Town Dispensary, and later to the Sick Children's Hospital. By and by appointments began to come to him in numbers; he was medical officer to John Watson's Hospital, the Trades' Maiden Hospital, and the Trinity Fund; and he was a manager of the Royal Infirmary and a governor of Donaldson's Hospital. But Dr Dunsmure always found time in his busy life for his weekly morning on the golf links, and he greatly enjoyed a holiday on the moors with his gun. His death has caused a blank among us difficult indeed to fill.

*Dr Andrew Balfour* of Portobello was born in Hong Kong in 1852, his father being the doctor in charge of the Seamen's Hospital there. Soon afterwards the family came to Portobello, where Dr Balfour, senior, soon had a large practice. Dr Andrew, as he came to be known, graduated as M.B., C.M. at the University of Edinburgh in 1873, and took the degree of M.D. in 1877. His activities were nearly all centred in Portobello: he was its Medical Officer of Health till it was absorbed in Edinburgh; he was visiting physician at the Portobello Fever Hospital; he was medical officer to the Post Office; he was medical officer of the Portobello District of the Edinburgh Parish Council; he was the chief founder of the Portobello Working Men's Institute; and he was a J.P. He was closely identified with all good causes, and his somewhat sudden death from heart disease on 26th December 1906 caused widespread grief among his many friends and patients. A public memorial has since been erected to him, which bears this epitaph: "A skilful doctor, an earnest Christian, an active townsman, and foremost in every good work."

*Dr Thomas Duddingston Wilson* died on 8th March 1906. He was an M.A. of Edinburgh, an M.B., C.M. of the year 1875, and an F.R.C.S. of 1879. His father was an Edinburgh practitioner, and the son followed in the father's footsteps, for he was for more than twenty years in practice in the Newington district of the town. At first he acted as medical superintendent at Craiglockart Hydropathic Institution, and then, in 1883, he took up residence in West Newington House (in which, by the way, some years of my boyhood were spent). At his death Dr Duddingston Wilson was President of the South Edinburgh Division of the British Medical Association and of the Newington Unionist Club. He joined our Society in 1879, and he occasionally took part in the debates, more especially in those dealing with electrical and physical questions.

*Dr William Swanstone Spence Reid* became a Fellow of our Society in 1880, having graduated M.B., C.M. in the University in 1878, and acted as resident medical officer in the Royal Maternity Hospital and in Chalmers Hospital. At the time of his death (25th June 1907) he was in practice in Kirkcudbright, where he held several appointments.

*Dr Allan Cuthbertson Sym* died on 1st February 1906. He graduated in the University of Edinburgh as M.B., C.M. in 1883, and as M.D. two years later. He was elected a Fellow of our Society in 1885, and to the twelfth volume of our *Transactions* he communicated an article on a *Case of Vesicular Placenta* from a premature birth at the seventh month, the child being born alive. It may be said with confidence that had we then known what we now know regarding the hydatid mole and its sequel, the chorion-epithelioma, Dr Sym's contribution would have excited a great deal of interest. As it was, the discussion very clearly brought out the fact that the Fellows regarded the case as one presenting many novel and apparently inexplicable features. Dr Sym also exhibited several specimens of more than passing interest, and read two short notes on a case of *annular hymen*, and on one of *injury to the fœtal neck* through pressure of the umbilical cord.

*Dr William Wood* died on 7th April 1906, at the early age of forty-one. He was elected a Fellow of our Society in 1892, having graduated M.B., and C.M. in the University of Edinburgh in 1890. He was a Yorkshire man, and his lectures on Materia Medica and Therapeutics owed much of their striking success to this fact, for Dr Wood was able to adorn them and to make them memorable by the dry humour and the arresting turns of phraseology which are part of the mental equipment of those who come from the shire of broad acres. He was elected a Fellow of the Royal College of Physicians in 1904, and he was the author of several books on *Materia Medica* and *Pharmacy.* His death caused a gap in the ranks of the Edinburgh teachers which will not easily be made good.

The news that *Dr David Milligan* was dying of an incurable malady came to me last spring as a great shock. It seemed as if it were only a week or two since I had seen him passing, alert and strong, through our streets. Dr Milligan turned to medicine after he had passed some years in banking. Like Dr Allan Sym, he was one of my fellow-graduates in the University of Edinburgh in 1883; and he soon built up a large practice in the west end of our city. He joined our Society in 1893, and he collaborated with me in an article on *Fœtal Scarlatina* which appeared in the eighteenth volume of our *Transactions.* He was a faithful friend, and he met his end as a brave man should.

*Dr Peter Burden M'Nicol* of Stirling graduated in the University of Edinburgh as M.B., C.M. in 1886, and as M.D. in 1900. He joined our Society in 1902, and died last year. He was in practice in Stirling, where he held several important appointments.

In his valedictory address, Dr Brewis, my predecessor in this Chair, made a touching reference to the early death of *Miss Mabel Ross,* the first of our Lady-Fellows to be thus taken from us. To-night it is my sad duty to speak of another loss this part of our Fellowship has sustained in death, from the dread cerebro-spinal meningitis, of *Dr Jessie M'Laren M'Gregor.* Dr M'Gregor was a student in the Surgeons' Square School of Medicine for Women, Edinburgh, and in 1892 she passed the examinations for the Triple Qualification of the Royal Colleges; four years later, when University degrees where thrown open to women students, she graduated as M.B., C.M., and two years after that she took the M.D. degree, her thesis (on the comparative anatomy of the auditory nerve) gaining the much-coveted Gold Medal. Meanwhile she had settled in private practice in Edinburgh, and in February 1901 she was elected a Fellow of this Society, being the first woman-graduate to enter the Fellowship. At the same meeting Dr Hilda M'Farlane was elected, and at the next Dr Elsie Maud Inglis. Dr Jessie M'Gregor held several appointments in Edinburgh, and she carried on a class in gynæcology for women students in Surgeons' Hall. She contributed to our *Transactions* a paper on *Papillary Cyst of the Labium Minus;* but her best piece of work is her book entitled *A Contribution to the Pathology of the Endometrium,* published in 1905. Family claims and considerations led her to cross the Atlantic and to settle in Denver, where she had already begun to make her mark both as a clinician and as a scientific worker, when death came upon her on 22nd March 1906.

## Retrospect of Sessions 1905-6 and 1906-7.

Although the Society has lost during these two years so many Fellows of note, it is a matter for congratulation that its ranks have been strengthened by the admission of fifty-two new Ordinary Fellows. The vacancies in the list of Honorary Fellows have been filled by the election of Professors Makejev of Moscow, Bossi of Genoa, and Kinoshita of Tokio, while the name of the Father of the Society (Sir Alexander R. Simpson) has been transferred from its place at the top of the list of Ordinary Fellows to an honourable position among the Honorary Fellows.

The secretaries, Drs Lamond Lackie and Barbour Simpson, have continued with marked success to present us with interesting and full billets, so that the monthly meetings of the Society have proved as enjoyable and profitable as ever. The editor of the *Transactions* has succeeded in handing to the Fellows two annual volumes containing a series of forty-one papers of a high degree of merit. These two volumes, containing 328 and 334 pages respectively, are the largest which have appeared since the Index volume of 1895-6, with the solitary exception of the volume for 1900-1, which, however, contained several articles which had been communicated in previous years and had been allowed to stand over. I think, therefore, that we may feel sure that the life and health of the Society as measured by the delicate and certain test of the work done at its meetings are thoroughly satisfactory. Our finances, likewise, are most satisfactory. How, indeed, could it be otherwise, with Dr Craig presiding over this necessary and important department of our affairs? Our library still lacks the required habitation in which our librarian, Dr Haultain, should be able to display its treasures to our gaze. Is there no obstetric Mæcenas among us to give us a room for our books? Our *Transactions* might, at any rate, be furnished with a list each year of the additions which have been made to the library through exchanges and donations.

* * * * *

A few weeks ago I received a letter from an obstetrician in England in which he asked me what was the present state of my project for the establishment of pre-maternity hospitals;

and some time before that I had a request from the editor of one of our medical journals that I should furnish him with some records of cases of diseases of pregnancy treated in the Royal Maternity Hospital here under my care. It seemed to me, therefore, that I might give the information required and comply with the editorial suggestion in this valedictory address; and I was the more anxious to do so as it happens that I have never up till now brought before this Society the subject of pre-maternity hospitals at all.

In November 1900 I first touched upon the subject of the hospital accommodation of pregnant women suffering from one or other of the diseases incident to gestation, in a clinical lecture on abortions given in the Royal Maternity and Simpson Memorial Hospital here. This lecture was afterwards published in the *International Clinics* (Series XI., vol. ii., p. 231, 1901), and I quote the concluding paragraph. It ran thus:

"Finally, I may perhaps be allowed to say that it has seemed to me that there is a want in our hospital system—the necessity for some special institution in which cases of recurring abortion, habitual premature labour, habitual fœtal death, hydramnios, and pathological pregnancies in general might be both studied and treated. Such cases are not at present welcome in general hospitals, for there is an objection to turning the wards into maternities; neither are they acceptable to the maternity staff, for they are 'not at the full term of pregnancy.' There ought, I think, to be some such hospital—it might be called a 'pre-maternity'—in which the investigation of the morbid states of pregnancy might be carried on and their treatment elaborated and placed upon a sure basis founded upon experience."

Soon after this, on 6th April 1901, the *British Medical Journal* published my plea for a pre-maternity hospital, in which I stated, at greater length and with all the persuasive force of which my pen was capable, the necessity I thought there was for such an institution, and the advantages, scientific as well as humanitarian, which I fancied would accrue from its establishment. I may quote a few sentences from this article, for it contained all the principles I had to enunciate, anything further that has appeared since having been elaboration of details:

"The pro-maternity hospital need not be a separate establishment; it may quite well be an annexe of the maternity. In time it may come to be of equal size with the maternity, but it must be distinct from the maternity; it will be for the reception of women who are pregnant, but who are not yet in labour. In the first place, doubtless, it will be for the reception of patients who have in past pregnancies suffered from one or other of the many complications of gestation, or in whose present condition some anomaly of the pregnant state has been diagnosed; but in time it may be taken advantage of by more or less normal ambulants—working women, for example, who ought to rest during the last weeks of pregnancy. . . . When labour pains came on they would be transferred to the adjoining maternity, and it would therefore be advisable that the two buildings communicate by a covered way; for example, it might be a system of linked hospitals. . . . One of the principles of the pro-maternity would be the conservation of fœtal life, although, of course, not at the expense of maternal safety; the result aimed at would be the continuance of the pregnancy with safety to the mother; that would be the ideal. . . . In a pro-maternity we might be able to study with scientific exactness, not only the pre-eclamptic, but also the pre-albuminuric modifications of the urine, and we might also discover the relationship which exists between the absence of normal thyroid hypertrophy and the presence of albumen in the urine."

In May 1901 the editor of the *American Journal of Obstetrics* kindly published my vision of the twentieth century, entitled, "A Visit to the Wards of the Pro-Maternity Hospital." It was my dream of what such a hospital might be: an international institution, situated somewhere between France and Germany, manned by a staff of medical experts of various lands; and with, at the head of it, Dr Anthony Nathan Patholog, while under him worked Dr Geburtsmal and Dr Mondkalb, Germans; Dr Loeuimalade, a Frenchman; Dr Embranowsky, a Russian; Dr Feto of Florence, Dr Teras Teratos of Athens, and Dr Ariston Hudor, the last named being in charge of the ward for habitual inebriates who were being kept from all alcoholic preparations during their pregnancies. There were to be wards also for the prevention of habitual abortions and fœtal death, for the treatment of syphilitic pregnant women, with the view to lessen the risk of infection of the fœtus, and for the prophylaxis of such hereditary maladies as hæmophilia. This article was of course nothing more than a *jeu d'ésprit;* but it unexpectedly served a useful purpose, for it was translated in full into German by Professor Kleinwächter, and appeared under the title of "Ein Besuch in den Sälen des Pro-Maternité Hospitales" in *Der Frauenarzt* for 20th September 1901.

Meanwhile several criticisms of the suggested pro-maternity hospital had reached me. It was suggested, for instance, that the name was rather misleading; that the terms was in point of fact a hybrid word. I intended it to be understood as meaning a hospital into which pregnant women, suffering from some of the maladies of gestation, or pregnant of infants who might be diagnosed as deformed or diseased, should be admitted prior to their delivery in a maternity hospital. I used the word "pro" in its Greek sense of "before" or "in front of," not in its secondary Latin one of "in favour of." I therefore changed the name to "pre-maternity," which more clearly indicated my meaning, and I have since then continued to employ this word. Other criticisms which reached me were that I was not proposing anything new; that I was advocating a place for the reception of unmarried pregnant women, where they might get every attention, medical and hygienic; that I was thus making things easier for fallen women, and possibly even encouraging what every one wished to hinder. It was pointed out by Professor Kynoch in the *British Medical Journal* (13th April 1901) that pre-maternity hospitals had existed as far back as the seventeenth century, there having been wards for the *femmes enceintes* in the Hôtel-Dieu at that time. Professor Kynoch, however, admitted that patients entered the Hôtel-Dieu at an early date of their pregnancy to ensure secrecy as to their condition, and not to obtain pro-treatment. These criticisms led me to take up the subject of Hospital Accommodation for the Pregnant Woman in an introductory lecture to my class in October 1901. In a summary of that lecture, published in the *British Medical Journal* for 19th October 1901, it is stated:

"That Dr Ballantyne did not ask for an asylum, or reformatory, or secret maternity; such institutions already existed, and doubtless had their function. What was required was a medical institution or part of one, a hospital or part of a hospital, in which the medical wants of the pregnant patient and of her unborn child would be considered first."

Let me say again, now, that I fully appreciate the good work that is being done in such places as the Edinburgh Rescue Shelter at 18 Graham Street, and at the Lauriston Home for Maternity Rescue Work; indeed, through these institutions I have, on several occasions, received into the Maternity Hospital cases of morbid pregnancy which might otherwise have not been recognised as pathological until labour supervened, and which might therefore have had much less satisfactory terminations from the medical standpoint. But my intention was not to agitate for the establishment of another home of that kind. What I asked for was a hospital for the reception of women suffering from the diseases of pregnancy, a hospital the entrance into which was not given to a woman because she was married, nor yet because she was unmarried, but solely because she was ill and pregnant. It was my hope that, just as the Maternity

Hospital contains married women as well as unmarried, so the pre-maternity hospital's beds would be open to all women suffering from the maladies incident to gestation, whether they were legitimately or illegitimately pregnant. The ideal would be a hospital in which all the beds were occupied by married women, but no woman would be refused because she was unmarried. The permission to enter would be always *medical;* the patient would be admitted because she was ill and pregnant, or because she was pregnant, and had in previous pregnancies developed morbid states in herself or in her unborn infant which it was supposed might by prophylactic measures be prevented.

It was in July 1901 that my hopes regarding the establishment of a pre-maternity hospital, which had been drooping somewhat, were revived by the receipt of a letter from a friend who had all along thought well of the proposal. This letter contained the welcome intelligence that the writer had given a sum of money (£1000) to the Edinburgh Royal Maternity and Simpson Memorial Hospital for the endowment of a bed to be used for the treatment of patients suffering from the diseases of pregnancy. The bed was named the Hamilton Bed, in memory of Professor Hamilton, who had so much to do, one hundred and ten years before, with the founding of the Edinburgh Maternity Hospital (1791). In November, when Sir Alexander Simpson took over the hospital, he was able to open the Hamilton Bed by putting into it a patient suffering from hydramnios; and, as I acted as assistant physician at this time, I had an opportunity of superintending the four or five cases treated in it during the next three months. The case of hydramnios, which was also one of vomiting, had a somewhat curious termination, to which I shall make reference when I come to record some of the results of treatment in the Hamilton Bed.

The establishment of this special bed in the hospital stimulated me to fresh efforts to bring the idea of a pre-maternity hospital before the profession, and on 11th January 1902 I published in the *British Medical Journal* a lecture (given in the hospital on 6th November 1901) on "Maternities and Pre-maternities." In this lecture I restated the case for the pre-maternity. I made known the fact that there was now in the Edinburgh Maternity Hospital a bed set apart for the study and treatment of the diseases of pregnant women; and medical men in Edinburgh and the neighbourhood were not long in sending in suitable cases. Indeed, in February 1902, a short article on the Hamilton Bed and on the cases which had already been treated in it appeared in the *Scottish Medical and Surgical Journal;* it was from the pen of Dr Oliphant Nicholson. There were also about this time several other encouraging occurrences. For instance, in the *Lancet* of 2nd November 1901 there appeared a leading article entitled, "Puerperal Eclampsia," from which I quote the following paragraph:—

"We are inclined to think that if a correct knowledge of the causation of eclampsia is ever to be arrived at, attention must be mainly directed to the pre-eclamptic stages of the disease. Further investigations must be devoted to careful observation of all departures from the normal in the health of the pregnant woman. Then, and then only, will it be possible to practise preventive medicine—the highest art of all—in the case of the pregnant woman and of the fœtus *in utero.* The opportunities of a scientific study of the various problems connected with pregnancy are at the present day almost *nil;* the length of the time such patients remain in lying-in hospitals before their confinement is too short for any prolonged observations to be made, and work of this nature is impossible in private practice. It is an encouraging sign to see that, mainly owing to the strenuous advocacy of Dr J. W. Ballantyne, and the generosity of Dr Freeland Barbour, a bed is to be endowed and set apart for the study of the diseases of pregnancy in the Royal Maternity Hospital of Edinburgh. We can imagine no more worthy object for philanthropy than the endowment of such beds in some of our large maternity hospitals, where the diseases of pregnancy and of the unborn child could be investigated with all the advantages of modern science. It is by research in this direction that we are most likely to gain a true knowledge of the problems of eclampsia, and of the best means of preventing this dangerous complication of pregnancy."

It was about this time also that the *British Medical Journal,* in a leading article (19th October 1901) upon Diet in Pregnancy, more especially in connection with Prochownick's method of influencing the size of the fœtus and the character of the confinement by altering the diet of the mother, affirmed that "the truth of Prochownick's statements could only be adequately ascertained in such an institution as the promaternity (or more correctly, pre-maternity) hospital may yet turn out to be."

Several American medical journals, in reviewing the first volume of my work on *Antenatal Pathology,* took occasion to touch upon the advisability of establishing pre-maternity hospitals for the observation of pregnant women in whom gestation was not running a normal course; the *Medical Review,* for instance, "heartily supported the suggestion," while the *Boston Medical and Surgical Journal* (April 1903) spoke of "the idea of a pre-maternity hospital which is fast coming into favour, and is undoubtedly bound to have a place in connection with lying-in hospitals in the near future."

It was, therefore, with great interest that I heard in December 1903 of the proposal that the new maternity in connection with one of the London colleges should be provided with a ward for the diseases of pregnancy. The information came to me in a letter from the obstetric physician, and in reply I gave him all the information I possessed on the subject, including, of course, a reference to the kind of cases which were being dealt with in the Hamilton Bed. During the past three or four years I have written almost nothing on the subject of pre-maternities, for I felt—and, I think, rightly—that the profession had accepted the statement that such institutions were desirable, and almost necessary, for the further development of the practice of obstetrics and for the safeguarding of fœtal life. I was convinced also that in time funds would be forthcoming for the building, furnishing, and staffing of pre-maternity wards, pavilions, or linked hospitals in connection with existing maternities. I broke silence once more, however, at the National Conference on Infantile Mortality, held in London on 13th and 14th June of last year, and what I said then I may be permitted here to repeat.

"When a pregnant woman is attacked by a disease, and more particularly by a disease which is due to her pregnancy, it is often extremely difficult to obtain hospital treatment for her; it is even difficult to get her into an hospital at all, for many maternity hospitals do not receive patients until they are in the first stage of labour, and most general hospitals are chary of admitting to their wards women who are near confinement. And yet, as is well known, the diseases of pregnancy are most deserving of treatment in many instances, while in some cases a mother's and a child's life may be saved thereby. It was with reasons such as these in my mind that I proposed the establishment of pre-maternity hospitals in close association with our maternities, but not, if possible, within the same four walls, and not under the same nursing and administration. To these buildings pregnant women would be admitted, not because they were married, not because they were unmarried, but simply because they were the subjects of pathological pregnancies. In such pre-maternity hospitals the diseases of pregnancy would be made the subject of special study, and the best treatment, keeping in mind both mother and unborn infant, would be carried out. Failing the immediate construction of such institutions, I recommended the setting apart of one or two wards, or one or two beds, in the maternity hospital for the reception and treatment of pregnant women suffering from the maladies of pregnancy. My reason for pushing the larger scheme is that there is evidence that the residence of pregnant women in a maternity hospital for weeks or months before confinement has been shown to be not entirely free from risk. Apparently the association of the two classes of case, the pregnant and the puerperal, is not for the best interests of the former; the want of exercise and interest is not good; and in a word there is a lack of the special conditions of environment and diet and treatment which a pregnant women needs, and which are not the same as those required by a puerperal one. At the same time, even the single bed that we have in the Edinburgh Maternity Hospital has been a benefit. It has, for instance, been a comfort for medical practitioners in the neighbourhood to know that they could send suitable cases into the hospital with the assurance that they would be taken in, not out of courtesy as it were, but by right; and I know from experience that the treatment such patients have received has been of value in averting abortion and miscarriage, and in producing a more nearly normal state of health before the supervention of labour with all its risks. But it is, I think, unnecessary to elaborate arguments in favour of pre-maternity hospitals; they are self-evident, and further, the principle of them has been admitted in America and in this country since I published my plea for them in the *British Medical Journal* in 1901, and in several other places and at several other times since then. It seems to me that without some such institutions the study of the causes and the recognition and treatment of the diseases of pregnancy must continue to be greatly hampered and hindered. To mention only one advantage before passing from this subject to another, I may name that of being able to check the diet and the drink in cases of albuminuria and the diseases due to alcoholism" (1).

If further proof were needed that the question of the desirability of pre-maternity hospitals had passed out of the personal into the general phase, it is to be found in two circumstances which have recently come under my notice. One is the fact that Dr T. Arthur Helme, in his address on The Unborn Child, delivered in Manchester on 20th June 1907 (2), thought it sufficient to affirm that one of the duties now resting upon the medical profession and the State was the provision of hospitals for the reception of women during pregnancy. Dr Helme used no arguments, gave no details, and evidently anticipated no objections. Another incident whose significance cannot, I think, be missed is recorded in the following paragraph, which appeared in the *British Medical Journal* for 20th January 1906.

"In honour of the German Emperor and Empress's approaching silver wedding, and to carry out one of the favourite ideas of the Empress, Charlottenburg has decided to erect a small model lying-in and infants' institute. There are to be thirty beds for women expecting confinement, who are to be allowed to stay on until their child is three months old, and thirty beds for infants to be fed artificially."

I presume that some of the beds, at any rate, will be set aside for pregnant women who are ill. When Germany has got its pre-maternities there will doubtless be hope of their early institution in this country.

## Cases Treated in the Hamilton Bed.

It generally happens that theories, when tested by experience, work out somewhat differently from what was expected, and it was so in the case of the Hamilton Bed. I anticipated that as soon as the bed became available for the treatment of cases of morbid pregnancy we should have a patient under our care in it for a period of, say, a fortnight or a month; that during this period we should have time for exact researches on the functions of the body, including analyses of the urine, examinations of the blood, and investigations of fæces, etc.; that then there would be time to institute some rational method of treatment and judge at one's leisure the results. But I was calculating without taking into account the proverbial uncertainty of the supervention of labour. This was borne out in the case of the very first patient who occupied the Hamilton Bed.

### *Hydramnios with Vomiting.*

The patient, a multipara, 37 years of age, believed herself to be in the seventh month of her eleventh pregnancy. She had had a somewhat disastrous reproductive history. Her first pregnancy ended in the birth of twin girls, both of whom died about a fortnight after birth; her second pregnancy terminated prematurely at the eighth month, the child being dead-born; the next four labours seemed to have been normal, but all the infants, males, died shortly after birth; and the next four gestations resulted in the birth of boys, all alive still. She had suffered from vomiting, more especially during the past three months, and was emaciated. Her pulse on admission was 109, and her temperature was 99°, rising to 101° the next day. After she had got a good action of the bowels her temperature fell below normal, but her pulse remained rapid and was seldom below 100. The circumference of the abdomen at the level of the umbilicus was 34½ ins.; the fundus uteri was felt about 2 ins. below the ensiform cartilage; the uterus was greatly distended with fluid; ballottement was easily got, the fœtal head was felt at the fundus, and fœtal small parts could be palpated and seemed to be numerous. No fœtal heart sounds could be heard, but the uterine bruit was audible. Keeping in mind the frequent association of hydramnios and fœtal deformities, I expressed the opinion that the infant in this case might be found to be monstrous.

The first matter, however, which engaged my attention was the relief of the sickness; and for this purpose the patient was put on a diet of milk, was kept resting in bed, and had the bowels regulated. In a day or two she was able to take and to retain some porridge. Then I made up my mind to try whether I could not reduce the amount of liquor amnii by the administration to the mother of frequent small doses of magnesium sulphate; I thought I might in this way get a hint as to whether there was free circulation of the liquor amnii from the mother's circulation into the amniotic cavity and back again. This treatment was commenced on 11th November; but on the same night labour pains came on, and when I arrived at the hospital the next morning the resident physician introduced me to twin girls who had been born at an early hour. The labour had been rather slow, and it had been found necessary to rupture the membranes, when a quantity of liquor amnii, estimated at about two pints, had escaped. Soon afterwards the first child was born, the head presenting; a minute later the second child was born by the breech; and the single placenta was expelled two minutes and a half later. The twins had a close resemblance to each other, the first weighing 3 lb. 15 oz., and the second 3 lb. 11 oz. After labour, the pulse and temperature became normal, and the puerperium was uninterrupted. Such was the almost ludicrous termination of our first attempt to forecast the future of antenatal affairs.

This case was the first that was treated in the Hamilton Bed; but I find in the official record of the hospital that another and an earlier case of vomiting in pregnancy was credited to it. When Professor Simpson and I took over the hospital on 1st November 1901, there was then in the wards a patient believed to be suffering from

### *Hyperemesis Gravidarum.*

It was calculated that she was two and a half months pregnant, and it was said that she had been rejecting her food for five weeks. She had been treated medically outside the hospital, and had, during the last week of October, been sent in for further treatment—viz., the induction of abortion. Her temperature was subnormal; her pulse was 88, small, thready, but of high tension; and there was a trace of blood in the urine. She was a nullipara, 30 years of age. She was put upon rectal feeding; no food at all was given by the mouth. The nutrient enemata consisted of milk, brandy, and meat juice, with 15 grains of bromide of potassium in every second enema. Under this treatment her condition had improved somewhat; but soon after 1st November she became worse, her temperature remaining subnormal, while her pulse rose to 100. I found her seriously ill; she was much emaciated; the abdomen was flat, almost scaphoid; the mammary changes were not characteristic of pregnancy, and the uterus was found lying retroflexed and enlarged. Under an anæsthetic I tried first to replace the uterus, and I partially succeeded, but a part of it seemed to be fixed in the pelvis by adhesions; then I attempted to dilate the cervix digitally, in the hope that the stretching might reflexly influence the vomiting. The firmness and resistance of the cervical tissues were well marked, and it was at this stage of the proceedings that I began to doubt the existence of pregnancy. Having once got this idea into my mind, I made another abdominal examination, and thought that I detected something like a tumour in the epigastric region, and that the cause of the vomiting was gastric.

The patient was sent into the Royal Infirmary, whence in a day or two came the news that a small fœtus and decidual membranes had been expelled from her uterus. The patient recovered; but it was long before my confidence in my powers of antenatal diagnosis was restored.

### *Epilepsy (?) in Pregnancy.*

Another case of morbid pregnancy was treated in the Hamilton Bed during the winter quarter of 1901-2. The patient was 26 years of age. She was a dwarf, her height being only 4 ft. 4½ ins. Her first pregnancy had terminated three years previously in an embryulcia, and it was calculated that the child had been dead for a week before birth. Her second gestation ended spontaneously at the sixth month; she had no medical attendance in this confinement. During both the first and second pregnancies she had suffered from fits. She had not had any previous to her first pregnancy, and they did not happen during the labours. They were less severe in the second gestation. She was now (November 1901) pregnant for the third time, and it was calculated that she had arrived at five and a half months. The fits had been troubling her during the whole course of this gestation; she described them as fainting fits; and she stated that she could generally tell when they were coming on. She had been surrounded by people suffering from epilepsy; her husband took bad epileptic seizures, and so did her stepfather and a stepbrother. There was not, however, any history of epilepsy in any of her blood relations. About the third month of the present pregnancy the patient began to experience difficulty in locomotion, and lately this difficulty had become so aggravated that she was only able to stand for a few minutes and walk for a few yards. Of course the urine was at once examined; it contained no albumen or sugar; urea was present in sufficient amount (7 grs. to 1 oz.), considering the patient's size and the diet she was put on. Daily estimations were made of the urine during the whole time the patient was in the Hamilton Bed, a period of eight weeks. Physical examination revealed the existence of a pregnancy of about the age indicated by the menstrual history; the fœtal heart was heard in the upper part of the uterus, where also the head of the fœtus was felt. The pelvis was found to be small and irregular; the external conjugate was estimated at $6\frac{5}{8}$ ins., and the diagonal conjugate at nearly 4 ins., but this was afterwards found to be an over-estimate.

For a few days the patient was put upon a milk diet, but this was discontinued when it was discovered that the kidneys were acting normally. It was then decided to try the effect of the Prochownick proteid diet in this case in order to keep the size of the child small and so facilitate labour, which it was thought might be induced about the seventh month and a half. Neither the milk diet nor the Prochownick produced any effect upon the fits; bromides were administered for a time, and they were followed by valerianates, but neither of these drugs had any appreciable influence. Dr Edwin Bramwell saw the patient on several occasions—once while she was in a convulsion. He inclined to the belief that the case was one of a group recently (1901) described by Sir Wm. Gowers, in which the symptoms were those of a functional or so-called hysteroid attack dependent, however, upon a transient and almost unnoticed attack of *petit mal,* or true epilepsy, which was, therefore, the underlying and fundamental condition. Sphygmographic tracings were taken on several occasions by Dr Oliphant Nicholson, and were found to show no increased arterial tension. There was no sign of heart disease; the heart was not hypertrophied. The fits were very erratic in their incidence and irregular in their duration; the longest one observed lasted for half an hour. After complaining of dizziness the patient shut her eyes and became unconscious; the fists were clenched, and the lower limbs became slightly rigid, sometimes only on one side; the tendon reflexes were very active during the fits; slight squinting was observed. The tongue was never bitten, there was no foaming at the mouth, and there was no cry. Some twitching was now and again noticed. A profuse quantity of pale urine was never passed after any fit, neither was there any globus hystericus, or blepharospasm, or contraction of the field of vision. The incidence of the fits was not affected by the presence or absence of other persons in the ward, nor by the making of vaginal examinations; there was no diurnal nor nocturnal prevalence of the seizures. Babinski's sign was never detected, and the pupils reacted, but somewhat sluggishly, to light and accommodation. The mental state was quite satisfactory. Although the patient's pulse-rate remained normal and the temperature was not raised, the general state was not good, for there was great weakness and almost complete inability to stand or walk. No doubt the unsatisfactory general condition of the patient had much to do with the unfortunate termination of the case. It was decided to induce labour about the middle of January—namely, at the close of the seventh month; but when the time came the child proved to be larger than had been expected and the conjugata vera smaller, and, as the patient and her husband were anxious for a living child, Cæsarean section was performed by Professor Simpson with myself as assistant. The child lived two days; the mother died on the fourth day, for, although there had been no rise of temperature, the pulse had remained fast and weak, and signs of septic infection of the abdominal incision had appeared.

This was a sad ending to a case which had been so long in the Hamilton Bed; and, although the patient did not succumb during her pregnancy but after delivery by Cæsarean section, yet I cannot help thinking that her prolonged stay in bed in hospital in a ward in which puerperal cases were being nursed was in some measure prejudicial. Further, the carrying out of special methods of regimen and diet, such as were adopted in this case, is a matter of some difficulty in a maternity hospital, and I doubt whether it was perfectly performed here. I was led by this experience to hope for a separate building for the management of pregnancy cases, or at least for a separate ward, and I have since been able to keep these pre-maternity patients more strictly to themselves. I have also aimed at benefiting them in the hospital and sending them out again to be for some time at home before the supervention of labour. I think that it is in this way that a bed or some beds in a maternity hospital will prove of most service for the treatment of the diseases of pregnancy. Another case of epilepsy in pregnancy has been recently treated in the Hamilton Bed during my quarter, and I pursued the above-named plan with it. The patient came in with a history of frequently recurring fits, and it was thought at first that they had been eclamptic in their nature. There was, however, no albumen in the urine, nor were there any other signs of renal disease. It was discovered that ever since her first pregnancy, ten years previously, this woman had suffered from convulsive seizures, almost certainly of an epileptic nature. It could not, however, be traced that they were consistently worse during the gestations. She was kept under observation and treatment in the hospital for three weeks, and then sent home as she was not yet at term.

It is with a feeling of relief that I now pass from these early and disappointing cases to some more recent and more encouraging experiences. I shall here refer to three cases of eclampsia which all occurred during my quarter in 1905, for, after all, if the usefulness of treatment during pregnancy is to be tested and established, it must be in connection with the most serious complications of gestation.

## Cases of Eclampsia.

### *Case* 1.

Mrs R., aged 33, was sent into the Royal Maternity Hospital by Dr George Dickson on 24th August 1905. She was pregnant for the fifth time. Her first three pregnancies terminated in normal full-time labours in 1897, 1899, and 1901 respectively: the first child was a boy, and the second and third were girls. The fourth confinement took place in September 1903; the child was a girl; the labour was easy, but there was some inflammatory trouble in the puerperium. All the infants survived. She nursed her last child till she was fourteen month old. She did not menstruate whilst nursing, and she has not menstruated since, so that the date of commencement of the present pregnancy cannot be estimated. She felt stirrage, however, in the beginning of April 1905, and expected to be confined about the end of August. During the whole course of the present pregnancy the patient has been in very poor health. She has had headache, constipation, faintness, giddiness, great frequency of micturition, dyspnœa, and cough with frothy expectoration. All these symptoms became worse as pregnancy proceeded. During the early months she noticed some œdema of the face in the morning and of the legs at night; and lately the œdema became more marked and generalised over the body.

During the week before her admission to the hospital the patient did not get a single motion of the bowels. She took a pill on the evening of 23rd August, and a seidlitz powder the next morning, but with no result. She felt very tired on the 23rd, had severe frontal headache, took no food, vomited several times, was dizzy, and could not see well. She spent the night walking about restlessly. On the morning of the 24th the same symptoms continued, and at 12 noon she threw herself on the bed thoroughly tired out. At 1.15 she took a fit, described as "like epilepsy." Her tongue was badly bitten. The fit lasted ten minutes, and before she regained consciousness she was attacked by a second fit of the same nature, but of greater severity. Drowsiness continued for an hour or two, and thereafter she became conscious of her surroundings. It may be added that her previous health had been good; she had had no fits, no dropsy, and had never suspected that she might have kidney disease.

At 5 P.M. she was admitted to the hospital. There had been no further fits since the second one, and no more vomiting. She was a big, strong woman, and somewhat plethoric. Her lips were cyanosed, and her breathing was heavy. The pulse was 120, regular, full, and of moderately high tension. The temperature was 99°·6, and the respiration-rate 25. Her face was of a dusky colour, and was swollen; her pupils were contracted and equal, and there was slight œdema of the legs. There were the usual signs of a full-time pregnancy. It was now that I first saw the patient. She was dull or semi-comatose, muttering when spoken to but not apparently realising her surroundings. At 5.30 P.M. (half an hour after admission) she had an eclamptic seizure. Chloroform was given, and a half-grain of morphine hypodermically. A large water enema was also given, but with no results. Three pints of saline were run in under the breasts, and hot bottles were placed round her. At 7.30 she was very restless, shouting, and almost maniacal. A third of a grain of morphine was given hypodermically. Another fit occurred at 9.30, during which chloroform was administered. Two minims of croton oil were given by the mouth. At 11 P.M. she was excessively violent and could not be held in bed; 6 grs. of chloral hydrate in water were given hypodermically. At 1 A.M. (25th August) she was quieter; 5 grs. of chloral were given. At 3 A.M. she had another fit, and she got 5 grs. of chloral hypodermically. An hour later (4 A.M.) an enema consisting of 2 oz. of castor oil, 2 oz. of Henry's solution, and 2 oz. of water was given with a small result. When I saw her at the morning visit she was much better; the bowels had moved well; there had been no more fits since 3 o'clock, and she was more rational. The urine became solid on boiling. Chloral and bromide of potassium were now given by the mouth. Steady improvement commenced under a strictly milk diet, and jalap for the regulation of the bowels. Two days later (27th August) the urine had a specific gravity of 1014, and was acid in reaction; it contained granular casts but no blood; the urea was 7 grs. and the albumen 0·86 gr. per ounce. There was marked optic neuritis, and some small hæmorrhages were seen in the left retina. On 29th August the pulse was soft and the œdema had gone. The patient was on strictly milk diet. The albumen was now 0·65 gr. per ounce.

On 1st September labour pains came on at 3 P.M. The position was L.O.A., and the fœtal heart was clearly heard. At 10 P.M. the os was as large as a five-shilling-piece, and the membranes were protruding. At 11 P.M. the membranes ruptured and five minutes later the child was born. The afterbirth was delivered without difficulty and there was no hæmorrhage. The infant, a female, was poorly nourished, and weighed only 3 lb. 11 oz.; she was put in the incubator. Milk diet for the mother was continued. On 7th September there was marked improvement in both mother and infant, but there was still a good deal of albumen in the urine, and on 19th September when the patient left the hospital, there was still a trace. The child was thriving. In January 1906, Dr Dickson was able to report that the patient had made an uninterrupted recovery, that she was then quite well, and was doing her work as usual. The infant also had done well and was strong and healthy.

### *Case* 2.

Mrs S., aged 22, was admitted to the Royal Maternity Hospital on 2nd September 1905. She was sent in by Dr Sullivan, and it was stated that she had had two eclamptic seizures the preceding evening. She was a primipara. She last menstruated on Christmas Day, 1904. She was living then in Hong Kong. Her health then became poor; she suffered from headaches; her face was puffy in the mornings. Her urine was scanty, dark brown in colour, and was passed with so much pain that she dreaded the act of micturition. These symptoms have persisted till the present time. She left

Hong Kong in April 1905, and reached London in June, after a very rough passage, during which she suffered from both morning sickness and sea-sickness. She made no attempt to diet herself either in Hong Kong or on the voyage. She had lately come to Edinburgh. Quickening had occurred at the sixth month. The headaches, always occipital in position, had been very troublesome, and the swelling of the face had become more marked.

A week before admission all her symptoms became more severe; the headaches were so bad that the patient could not sit down; the œdema spread to the whole body, and she was passing very little urine, not more than a breakfastcupful in the twenty-four hours. She was seen by Dr Sullivan on 1st September. He put her on milk diet. The same evening, when she was talking to her mother, she suddenly began to twitch all over; the movements lasted for a few minutes, and were followed by unconsciousness. Her tongue was bitten. A few minutes later she had another fit. Dr Sullivan gave her half a grain of morphine hypodermically.

She was admitted to the hospital the following morning, having had no further fits during the night. There was œdema of the face, with slight exophthalmos. There was also a considerable amount of hard œdema of the skin of the limbs. The pulse was small, hard, and beating at the rate of 80 per minute. The urine became quite solid on boiling; there were 7 grs. of urea to the oz. The patient was conscious, and complained much of occipital headache. Her abdomen showed signs indicating pregnancy at the seventh or eighth month. No fœtal heart could be heard, but the patient thought that she could detect fœtal movements. The fœtal head was felt lying at the brim, and the back was to the front and left.

I took occasion to examine the patient soon after her admission, and I called the resident's attention to the fact that the part regarded as the fœtal head was too soft for the head and too large for the breech. This observation is of special interest in view of the condition of the infant's head discovered at birth twelve days later.

The patient was put to bed between blankets, and was surrounded with hot bottles. She was given nothing but milk. The bowels were opened freely with compound jalap powder. Improvement began and continued for a week, the quantity of urine steadily increasing, and the headaches becoming less severe; then, however, the headache again got worse and was practically constant, and the eyesight became dim—at first a white cloud came over everything, and later everything seemed black. The ophthalmoscopic examination showed no distinct optic neuritis, but there was slight swelling of the right disc at the apparent lower and nasal quadrant, and the vessels were somewhat dilated; the pulse tension was high; there were slight labour pains; the amount of albumen in the urine increased to 1 gr. per oz., and the urea was estimated at 7 grs. per oz. The skin and bowels were kept acting freely, and the grave symptoms passed off. From the 9th to 13th September the patient remained in a fairly satisfactory state. Then labour pains came on, and at 4 A.M. on 14th September the os was found to be about three-quarters dilated, and through it a large soft presenting part could be felt; further examination disclosed bones with large membranous intervals in the part palpated at the os; the diagnosis of hydrocephalus was thus made, and the obscurity of the previous examination of the fœtal presentation was cleared up. Labour went on satisfactorily, and the vault of the hydrocephalic head was born as a long, sausage-shaped mass. The skin of the scalp was seen to be peeling off in various places, for the infant was dead. As there threatened to be some delay in the birth of the base of the cranium, Dr. H. J. Dunbar (one of the residents) applied the forceps, and with no great difficulty brought the head down. The infant, a female, weighed only 4 lb. 1 oz. From the degree of maceration it exhibited it may be concluded that it died either at the time when the eclampsia occurred (1st September), or when the aggravation of symptoms took place (9th September). The head was typically hydrocephalic, but there was no spina bifida or other malformation. The placenta showed one extensive hæmorrhage, situated centrally.

The patient recovered well from the delivery. No fits occurred at labour or in the puerperium, and the symptoms which had been so troublesome before delivery disappeared. Immediately before labour the albumen in the urine had been 1 gr. per oz. and the urea 7 grs. per oz., and hyaline casts had been present. On 15th September (the day after delivery) the urine had a specific gravity of 1030, the urea was the same (7 grs. per oz.), and the albumen was 0·86 gr. per oz. On 20th September the albumen had fallen to 0·12 gr. per oz., and the urea had risen to 8 grs. per oz. On 25th September the analysis was practically the same, and the specific gravity was 1015. On the 28th there was no longer any albumen, the urine was clear and without deposit, and the specific gravity was 1015. The patient left the hospital two days later, stating that she felt perfectly well. There was no œdema.

### *Case* 3.

Mrs Y., aged 35, was sent into the Royal Maternity Hospital on 24th September 1905. She was pregnant for the third time. The history of her previous pregnancies was as follows:—She gave birth to an eighth month child in December 1903; it was dead-born. For three weeks before the confinement the patient was troubled with swelling of the face and feet, so that she was unable to go about. She took her ordinary diet; her urine was not examined. Her second confinement occurred in October 1904; it was at the sixth month, and the fœtus was not viable. She never felt quickening in this pregnancy, and there was no swelling of any part of her body. She was now living in Portobello, and Dr Titterton was called to attend her at the time of the immature labour; he examined the urine after the expulsion of the fœtus.

The present pregnancy (the third) has the following history:—The last menstruation was on 7th April 1905. In June the patient began to suffer from severe headaches; her sight was dim at times, and she had some giddiness. She consulted Dr Titterton, who examined her urine, and told her that her kidneys were affected. She was put on a diet consisting almost entirely of milk. About six weeks later Dr Titterton told her that her water was all right again, and she began to take ordinary food, and continued to do so till 18th September, the day of the Royal Volunteer Review in Edinburgh. On that day she noticed that her legs and face were swollen, that her sight was dim at times, that the urine was very thick, and that she felt 'as if she could not be bothered to do anything.' The headaches had come back again. The doctor saw her. She was put to bed, and kept again on a restricted diet. During the following week the same symptoms continued, and the patient remained in bed. She noted the fœtal movements, which had occurred first at mid-term (she was now six and a half months).

She awoke on the morning of Sunday, 24th September, having slept soundly all night, and remembers seeing her husband making ready the breakfast. After that all was a blank to her till she regained consciousness in the hospital. Her husband said that without warning his wife took a fit; she did not cry out, but her face and limbs twitched violently. This occurred at 10 A.M.; a second fit followed at 11.30; a third took place at 4 P.M. when the patient was coming up in the ambulance to the Maternity Hospital; and a fourth supervened immediately after her arrival at 4.30. During the fit which occurred in the hospital chloroform was administered. The convulsions were of the usual eclamptic character, and were very violent. The tongue had been bitten in the preceding fit; and the patient's clothes were soaked in urine. Five grs. of chloral hydrate were injected into the gluteus maximus muscle, and the patient was put to bed between blankets, with hot bottles around her, and near a large fire. She was quite unconscious, and was very restless, muttering constantly and incoherently. She was a strong, muscular woman, and she tossed about so violently that it was necessary to tie her down in bed, else she would have fallen over the edge.

There was slight œdema of the legs and face. The rings of the trachea were easily felt, showing that the normal hypertrophy of the thyroid gland was not well marked. She had an appearance slightly suggestive of myxœdema. The pupils were somewhat contracted and equal, and the lips were slightly cyanosed. The pulse was 100, and the artery was markedly contracted; the temperature was 98°·2 F. An enema was administered, and a scanty, constipated motion resulted; she was then given 2 minims of croton oil in butter. The skin was quite dry, so after she had been an hour or two in the hospital she was put in a hot pack, but even this did not cause the slightest perspiration. About four hours after admission she became more restless and was given 10 grs. of chloral hydrate by the mouth; this she swallowed fairly well, but as it seemed to have very little effect the dose was repeated in two hours. She then became quieter and had a fairly good night. It should be added that a pint of saline was infused subcutaneously during the evening.

On 25th September she was still semi-conscious. She could not be made to speak at all; she was restless, and kept tossing about and muttering occasionally. The skin was dry and the temperature 99°; the pulse was 100 and of high tension. Two small watery motions were the result of the croton oil. As it seemed to me that the case was one of the thyroid type, I ordered the administration of thyroid extract (10 grs.) at

2.30 P.M. Two hours later the patient was fully conscious; she was perspiring freely; she could answer questions rationally, and realised where she was; and her pulse was distinctly softer in character. Five-grain thyroid tabloids were now ordered to be given every four hours. The urine had a specific gravity of 1036; it showed a copious deposit of urates, and it went quite solid on boiling.

She was much better on the following day (26th September). She had had two loose motions in the twenty-four hours, and had passed about 30 oz. of urine. She talked quite sensibly, and seemed happy. She was kept on a strict milk diet. She was still improving on 27th September. The tension of the pulse was not so high. Fifty oz. of urine were passed in the twenty-four hours; it still went nearly solid on boiling, and showed a copious deposit of urates. On 28th September 70 oz. of urine were passed. On 29th September the improvement was maintained; the bowels were kept open with medicine. The urine had a specific gravity of 1030, and the albumen amounted to 1·2 gr. per oz. She was feeling the movements of the fœtus quite distinctly; and the fundus uteri was about the level of the umbilicus, for the pregnancy was nearing the end of the sixth month.

During the following fortnight (1st to 14th October) the patient continued to improve in every way. The specific gravity of the urine fell to 1020, and then to 1015, and the albumen diminished to 0·77 gr. per oz., and then to a trace. She felt very well, and rebelled greatly against the strict milk diet. On 10th October it was thought to be safe to allow her a little porridge, toast, and milk pudding. She was passing 50 oz. of urine in twenty-four hours, and the bowels were being moved with the help of sulphate of magnesia. The thyroid tabloids were still being taken. On 17th October the patient went home to be under the care of her own doctor. Her condition was satisfactory, although there was a slight trace of albumen. The œdema had entirely disappeared from her face, causing a somewhat striking change in her appearance.

In January 1906 I obtained from Dr Titterton the following further notes of the case. The thyroid treatment was continued, and the patient did well until 24th October, when Dr Titterton was sent for, and found the os uteri dilating, the fœtal head presenting, and labour going on. The fœtus, placenta, and membranes all came away easily, and the patient recovered well. The fœtus had evidently been dead for a few days. A trace of albumen continued in the urine for a week after the lochial discharge had stopped; but it then disappeared, and the patient was quite well.

These three cases illustrate the kind of treatment it is possible to give to pregnant patients attacked by eclampsia. In each instance we were able to save the life of the mother and to allow the pregnancy to go on—surely the ideal treatment of gestational eclampsia. In two out of the three cases the patient was kept in the hospital until the labour came on, and in the third she was allowed to go home to be under the care of her own medical attendant. In the last-named instance I was influenced, no doubt, by the dislike I have to keeping pregnant women for a long period of weeks in ordinary maternity wards filled with puerperal patients. On the other hand, if she had stayed in, it would have been possible to have kept a more strict supervision of her diet, of the state of the urine, etc., than could be done in private practice. The death of the infant in the third case was disappointing, but, on the other hand, its survival in the first case was most satisfactory, almost surprising, if its size and condition be taken into account. The infant in the second case was, as has been stated, hydrocephalic. In all the three patients recovery was complete, as is proved by reports received some months later. It is also to be remembered that these were cases of eclampsia in pregnancy, not simply of albuminuria the precursor of eclampsia.

## ALBUMINURIA IN PREGNANCY.

Cases of albuminuria in pregnancy ought to be most successfully dealt with in a pre-maternity hospital, and no doubt in the future they will constitute the majority of the patients treated therein. As a matter of fact, there have not been many cases of this morbid form of gestation occupying the Hamilton Bed. The reason is not far to seek; it is difficult to persuade patients suffering from albuminuria to submit themselves to hospital treatment; they do not feel sufficiently ill, and their friends and relatives see no cause for their removal from home. As soon, however, as eclampsia declares itself, the friends are ready enough, nay urgent, to have the patient transported to the hospital. This is to be regretted, for there can be no doubt that it is much easier to prevent albuminuria leading to convulsions by proper and simple treatment than to save the mother and the infant in a pregnancy complicated with eclampsia by any means of treatment. I may here refer briefly to a case of albuminuria which was treated in the Hamilton Bed while I was acting as assistant physician in Professor Simpson's quarter in 1902.

The patient, a dairymaid, 20 years of age, was admitted to the hospital on 9th November 1902. She had arrived at five and a half months in her first pregnancy. For three weeks she had noticed swelling of her hands, and about five days before admission her friends had observed that her face was swollen. There had been no headache, no sensory phenomena, and no noticeable diminution in the amount of urine passed. She had been in the habit of drinking much milk. On examination there was found to be marked œdema of the lower limbs and a swollen, distended and tender state of the labia, especially the right labium majus. The back also was dropsical, and so was the right hand. The face was puffy and pale. There were the usual signs of pregnancy, and the fundus uteri was felt lying two fingerbreadths above the umbilicus. There was marked œdema of the abdominal walls and the exact lie of the fœtus could not be made out, but the fœtal heart was heard (rate, 160) on the right side, below the level of the umbilicus. The examination of the urine showed the presence of albumen, 14 grams per litre; the urea measured 2 grs. per oz.

On admission, the patient was put on a rigid milk diet; the bowels were moved by means of castor oil, and a Southey's tube was put in the right labium. On 10th November the urea had increased to 3 grs. per oz., the albumen measured 1$\frac{3}{4}$ grms. per litre. Five grs. of thyroid extract were given night and morning; this was continued for a fortnight. The bowels were kept acting freely by means of Henry's solution. On 16th November the albumen had fallen to $\frac{3}{4}$ grm. per litre, and ten days later there was only a trace. The œdema rapidly diminished. The temperature was normal, and the pulse-rate slow (60 to 70). On 1st December the red blood corpuscles numbered 4,512,000, and the white 9·266; there was 30 per cent., of hæmoglobin. She left the hospital on 5th December; the œdema had almost disappeared. She was now more than six months pregnant. She felt quite well. The fœtus was alive.

### Other Maladies of Pregnancy.

About 40 cases, in addition to these I have reported, have been treated in the Hamilton Bed since its establishment. I may refer to some of those dealt with under my own care. There was, for instance, a case of pseudo-angina with extremely curious and enigmatical symptoms and signs; the nervous symptoms improved markedly after labour. This patient was in the hospital for nearly a month during October 1905. Her child was born with a supernumerary auricle on the left side of the neck just above the clavicle. Another interesting case was one of old-standing hemiplegia with contractures; she was under observation for some time. Her infant also had a malformation—two congenital teeth in the lower jaw. This association of malformations in the infant and maternal nervous maladies has been noticed by me before. Then, again, there was a case of prolapse of the pregnant uterus at the sixth month. The displaced organ was replaced with some difficulty and a pessary inserted. The support, however, was insufficient, and so the patient had to be kept in bed and the vagina had to be packed daily; at a later date the pessary sufficed; and at a still later the patient was allowed to go home, the displacement not having recurred. Yet again there have been several anxious cases of heart disease complicating pregnancy, and calling in one instance for the induction of premature labour; the infant in this last-named case only lived for one month.

Other maladies have been treated, such as myxoma of the chorion, threatened abortion, accidental hæmorrhage, grave anæmia, hyperemesis, and hydramnios; but, as these were dealt with during the terms of office of my colleagues, I shall not refer to them. I regret that some degree of confusion seems to have been present in the minds of some of our resident physicians as to the nature of the cases that might find admittance to the Hamilton Bed. The very fact that a patient was in labour at the time of admission to the hospital ought, of course, to have debarred her from treatment in a bed set apart for the diseases of pregnancy; and yet in the official case-book I find details of several cases of eclampsia which seem to have been in labour either at the time they were received into the hospital or within a few hours afterwards, and I noticed one case of ruptured uterus which came in after labour had been going on for hours. Obviously it is impossible to form correct notions regarding the effect of preventive treatment in pregnancy in such cases. Again, I hardly think that it is wise to include cases which have been waiting in hospital for a few days before the induction of premature labour by such methods as the bougie or the hydrostatic bag. These considerations and others which have forced themselves upon me during the past few years have led me to make the following suggestions: First, in respect to pre-maternity beds in maternity hospitals, and, secondly, in regard to pre-maternity wards or pavilions or hospitals. I may add that apparently no patient has died in the Hamilton Bed during the progress of her pregnancy; but there have been a number of deaths within longer or shorter times of delivery. There was, for instance, the case of Cæsarean section, to which I have already referred; there were two of death after delivery in advanced cases of heart and kidney disease; there was one death after the performance of craniotomy in a patient with kidney disease; and there were several deaths from eclampsia, some of which should in no way be associated with the Hamilton Bed, for they were in labour when they were brought into the hospital, or they were in convulsions, which in a few hours induced labour pains. On the other hand, some of the most successful cases of preventive treatment, such as the three patients suffering from eclampsia whose histories I have recorded above, were not entered in the case-book at all. The only reason which I have been able to discover for these irregularities was a notion in my resident physicians' minds that all Hamilton Bed patients require to be seriously ill, and that the Hamilton Bed case-book was mostly for the recording of disastrous eclampsias.

From the experience I have had of the treatment of patients in the Hamilton Bed, I would make the following suggestions:—

## SUGGESTIONS FOR PRE-MATERNITY BEDS IN MATERNITY HOSPITALS.

1. The pre-maternity bed or beds should be strictly reserved for the reception of cases of morbid pregnancy.

2. If a patient suffering from one of the maladies of pregnancy pass into labour within forty-eight hours of her reception into the pre-maternity bed she shall not be regarded as a pre-maternity case, for, obviously, such a brief stay does not permit of any satisfactory attempt towards the effective treatment of her malady.

3. The pre-maternity beds should be placed in a ward by themselves, and should not be located in the ordinary ward used for the puerperal patients.

4. A sister should be in charge of these beds who has had a surgical and medical as well as an obstetric experience, for the nursing required will in most instances be more strictly medical or surgical than obstetrical.

5. No attempt should be made to adapt the diet of puerperal patients for the use of the pre-maternity patients, for as a general rule, the latter require quite different food.

6. Special case-taking forms should be used for the pre-maternity cases; it is unsatisfactory to attempt to utilise the back leaf or the margins of the ordinary forms or charts for the noting of the many clinical details which are of value and which ought to be recorded in such cases.

7. A special case-book should be kept in which every patient who has been in the pre-maternity bed for a period of more than forty-eight hours should be entered. If this is not done, patients may enter and pass through the hospital and leave no record behind them at all. If, for instance, a patient suffering from hyperemesis gravidarum or from retroversion of the pregnant uterus be treated successfully in the pre-maternity bed, she will probably not remain in the hospital for her delivery, but will leave at once for her home. This has happened on several occasions in my quarter in the hospital, and some interesting material has thus been lost.

8. In pre-maternity cases special attention should be paid to urine analysis, to examination of the blood and nervous

system, to ophthalmoscopic investigations, and to a detailed and thorough examination of the signs and symptoms of pregnancy, including estimations and descriptions of the fœtal heart and of the fœtal movements. (During the past three years one of my resident physicians has made a special study of the blood in pregnancy and labour, while another has investigated the tendon reflexes, and yet another has made a series of urinalyses.)

9. Suitable cases for treatment in pre-maternity beds are pregnant patients suffering from albuminuria, heart disease, intractable vomiting, pulmonary disease, hepatic disease, anæmia and other blood disorders, and various nervous maladies, especially epilepsy, hystero-epilepsy, hysteria, chorea gravidarum, and paralysis. Diseases of the reproductive organs themselves, such as retroversion of the gravid uterus, threatened abortion, pruritus and œdema vulvæ, uterine prolapse, cystocele, vulvar inflammation and abscess, uterine myomata as complications of pregnancy, and suspected ectopic gestation, might all very properly be treated in pre-maternity beds. Hydramnios and other conditions (such as twins) leading to over-distension of the uterus might likewise derive benefit; and cases of suspected hydatid mole, of placental hæmorrhage, missed abortion, or of antenatal death or deformity might with advantage be kept under observation. Further, patients who had suffered in past pregnancies from "habitual" abortion, "habitual" fœtal death or disease, "habitual" pre-maturity or post-maturity, or from eclampsia, might be dieted, kept at rest, or treated with medicinal means, etc., in future pregnancies, in order, if possible, to prevent the recurrence of these reproductive disasters. Patients who are pregnant and have already suffered from eclamptic seizures are not so suitable for pre-maternity treatment, unless it is clear that labour pains have not begun and show no tendency to begin; but even in these cases good results may sometimes be obtained, although conversative treatment after the occurrence of eclampsia is much less hopeful

than it is during the pre-eclamptic stage when albuminuria alone is present.

10. Cases which are unsuitable for treatment in a pre-maternity bed would seem to be infectious fevers (scarlet fever, measles, typhoid, erysipelas, etc.), occurring as complications of pregnancy (these should go to the fever hospital), and cases of insanity (mania or melancholia) in pregnancy (these should receive asylum treatment).

11. It is doubtful whether cases of syphilis should be dealt with, but I think that patients suffering from gonorrhœal vaginitis and vulvitis might be taken in and treated during their pregnancies. Alcoholism and dipsomania in pregnant women might perhaps be regarded as suitable for treatment, but actual delirium tremens should find a home elsewhere until the acute symptoms have passed.

## Suggestions for Pre-maternity Wards or Hospitals.

1. The pre-maternity hospital or ward should be connected with the maternity hospital, but should not be included in it; there should, where practicable, be two buildings connected by a covered passage or gallery.

2. The pre-maternity portion should resemble closely an ordinary general hospital in its construction and arrangement rather than a maternity hospital.

3. The management of the pre-maternity should be kept as far as possible distinct from that of the maternity. The nursing, the diet, the regimen, and to some extent the medical treatment required all differ from those in use in a maternity hospital.

4. The special details of diagnosis and treatment which have been referred to under the pre-maternity bed could all be carried out, and ought to be carried out, in the pre-maternity hospital or ward.

5. The same cases which were enumerated as suitable for treatment in a pre-maternity bed will, of course, be fit and proper cases for a pre-maternity hospital; but, in addition, pregnant patients suffering from syphilis might be received in a special ward, and more attention might, perhaps, be paid to the alcoholic cases.

6. There should be a resident physician whose business it would be to take charge of the pre-maternity hospital. The physician of the maternity hospital would make a visit each day, and there might profitably be a consulting physician and surgeon for the pre-maternity. It would be of immense advantage if young graduates, such as Carnegie Fellows or Scholars, would take up the investigation of problems of metabolism, of excretion, of circulation, etc., in pregnancy; the work could be done in connection with pre-maternity hospitals, but actual residence of the workers would not be necessary.

7. The supervention of labour would always be the signal for the transference of a patient from the pre-maternity to the maternity hospital; the patient's record would go with her, and would serve as a guide for treatment and diagnosis in the other part of the building. It may be found to be an advantage to give beds to patients awaiting the induction of premature labour for contracted pelvis; during their stay in the pre-maternity hospital they could be under close medical observation, and unsuspected morbid states of kidneys or of lungs, etc., might be detected; the exact age of the pregnancy might also be calculated, and possibly the early stages of the induction might even be carried out in the pre-maternity. At the same time, the pre-maternity hospital is essentially for the reception of morbid pregnancies.

## L'ENVOY.

It is now time that I brought this address to a close and that I vacated the Chair to which you so kindly called me two years ago. I thank you all for the forbearance you have shown during these months; I thank you all for the assistance you have always so kindly given; and I congratulate you upon the choice of a President which you have made this evening. Professor Stephenson is a man we may all feel glad and proud to have in the Presidential Chair of the Edinburgh Obstetrical Society. He joined our Society in 1861, and acted as secretary from 1863 to 1867; and since the seventies he has occupied an honourable position as Professor of Midwifery in the University of Aberdeen. To me personally it is a real happiness to welcome him to the Chair, for he gave to me, when I was a boy, his best medical attention and care; he welcomed me some years later as his co-examiner in the University of Aberdeen, and treated me most hospitably, when, during four years, I paid a twice-a-year visit to the Granite City; and he has ever shown to me the greatest kindness. I leave the interests of the Edinburgh Obstetrical Society in good and safe hands when I place them in those of Professor Stephenson of Aberdeen.

## References.

1. *Rep. Proc. Nat. Conf. Infantile Mortality,* London, 1906, p. 155.
2. *British Medical Journal,* vol. ii., 1907, p. 421.

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*Emeritus Professor Sir Alexander R. Simpson* moved a vote of thanks to the retiring President for his conduct in the Chair during two sessions and for his address.

*Professor Sir Halliday Croom* seconded the motion, which was carried unanimously.

*Professor Stephenson,* in taking the Chair, spoke of the surprise and pleasure which he had felt at receiving so high an honour from the Fellows of the Society, which had been all the greater because he had thought himself isolated from active participation in the doings of the Society since he had abandoned practice in Edinburgh and gone to Aberdeen. He alluded to changes in the Society since his former active connection with it. He rejoiced to find that it drew contributions not from Edinburgh alone, but from Glasgow, Dundee, and other places in Scotland, and even from England. He hoped to attend all the meetings of the Society, and would do his utmost to keep up the high reputation which the Society had always held.

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## MEETING II.—DECEMBER 11, 1907.

PROFESSOR STEPHENSON, *President, in the Chair.*

I. The following gentlemen were elected Ordinary Fellows of the Society:—A. Percy Wall, M.B., Ch.B., The Residency, Royal Infirmary; G. Raffan, M.B., Ch.B., The Residency, Royal Infirmary; R. G. S. Orbell, M.B., Ch.B., St Giles House; J. Alexander Gray, M.A., M.B., Ch.B., 4 Wolseley Terrace, Edinburgh; C. Hobart Houghton, M.B., Ch.B., 1 Hallfield Road, Bradford; R. P. M'Morland, M.B., Ch.B., 19 Merchiston Gardens; James Young, M.B., Ch.B., Milne Murray Lodge, Lauriston Park.

II. *Dr J. W. Ballantyne* showed—(*a*) AN ENGRAVING, which had been sent to him by his friend, Dr Fingland, of Liverpool. It was entitled, "Paul Chamberlin, M.D., 1658, from an original drawing," and it carried the information that it was published 30th May 1794, by W. Richardson, Castle Street, Leicester Square. It was difficult, however, to make the facts fit the portrait. In 1658 Paul Chamberlen was only 23 years of age, and the face in the picture is that of a man much older than that. Dr Ballantyne had been interested to find that Dr Aveling, our great authority on matters concerned with the Chamberlens had had the same difficulty with this portrait. Dr Aveling had boldly solved the riddle by regarding the portrait as that of Dr Peter Chamberlen, father of Dr Paul, who was born in 1601, and whose age, therefore, at the time noted on the picture would be 57. Certainly the face pictured more nearly agrees with the age of 57 than of 23. If this, then, were the portrait of Dr Peter Chamberlen, the third Peter, it was the representation of the most interesting of all the Chamberlens. To him has been usually ascribed the invention of the forceps, although there was reason for believing that the honour really belonged to Dr Peter Chamberlen the elder, the uncle of the third Peter. But even if he were not the inventor of the forceps, he was a man of a most inventive turn; for he had a scheme for propelling carriages along the roads by means of air, and he had formed the conception of the possibility of a union of the Jewish religion with all the Christian sects into one single church. For these views and others Scharffenberg has come to the conclusion that Dr Peter was the subject of mania, the type being *paranoia inventoria et religiosa.* He had a family of fourteen sons and four daughters.

(*b*) A specimen of the HYDATID MOLE, from a patient, 26 years of age, who had had one normal pregnancy eighteen months ago; the product of that pregnancy, a boy, was alive and was well formed; menstruation had never been regular, three or four months intervening between the periods. With regard to the present pregnancy, the last menstruation was in the end of June; there was amenorrhœa for seven weeks; then irregular red discharges began to occur, and the patient was treated for threatened abortion. Dr Ballantyne had seen her on 1st November, and had been struck by the fact that the uterus was larger than it ought to be if the gestation had begun at the end of June. No fœtal heart could be heard, and ballottement could not be got. Hydatid mole was, of course, thought of; but no vesicles had come away, and none were to be felt in the cervical canal; and there was also the history of irregular menstruation, which made it possible that the pregnancy had really reached the age which the size of the uterus seemed to indicate. She was accordingly treated for threatened abortion, and as long as she rested the hæmorrhage remained in abeyance, though it recommenced if she got up. The mole was expelled on 29th November, and the uterus was scraped out thoroughly. A good recovery has been made. The mass consisted of vesicles embedded in solid masses, which turned out, on microscopical examination, to be blood-clot. A report from the Laboratory of the Royal College of Physicians states that the cysts were lined with a cubical or sub-columnar or squamous epithelium, and that in places syncytium was present as well as Langhans's layer of cells. The case would be carefully watched for any indication of the development of chorion-epithelioma.

(*c*) AN ABORTION SAC from a patient, 28 years of age, who had had one child two years ago, the labour being normal. She last menstruated on 22nd September, and the sac was expelled on 1st December. There was no known cause for the abortion, but the patient was a delicate woman. Menstruation had been regular.

III. *Dr Haultain* showed—(*a*) A GROUP OF LARGE MULTIPLE SUB-PERITONEAL FIBROIDS growing from a uterus which was only enlarged to a small extent—cavity 3½ inches. The fibroids had produced torsion of the uterus through about two-thirds of a circle. (*b*) A UTERUS WITH A SOFT SUB-PERITONEAL FIBROID, the antithesis of (*a*), growing from the supra-vaginal portion of the cervix, the cavity of the uterus in this case being enormously enlarged. In both cases the operation performed had been sub-total hysterectomy.

IV. *Dr W. Fordyce*, on behalf of *Mr Scot Skirving*, showed the UTERUS of a patient of 70 with LARGE SUB-PERITONEAL FIBROIDS. The uterus had undergone torsion to such a degree that its anterior surface had come to lie posteriorly. Intestinal obstruction had supervened, necessitating an emergency operation, which had been performed by Mr Scot Skirving. The patient did well at first, but died on the seventh day from congestion of the lungs.

V. *Dr Haig Ferguson* showed—(*a*) Two specimens of FUNDAL CARCINOMA, removed by abdominal section—panhysterectomy. Both the patients were nulliparæ—one aged 59, the other aged 36. The first was associated with multiple fibroids of the fundus uteri—the adeno-carcinoma was apparently independent of the fibroids. Both the conditions were diagnosed by microscopic examination of the uterine scrapings. In the older patient the cervix was so atrophied and friable as to be incapable of sufficient dilatation to admit a curette, and access to the uterine cavity had therefore to be secured by detaching the bladder from its anterior aspect and splitting the cervix in the middle line, the parts being restored afterward by catgut stitches.

(*b*) DERMOID TUMOUR OF THE OVARY WITH NO PEDICLE. This was removed from a patient whose only symptom was retention of urine. The tumour was densely adherent behind the uterus, and on separating the adhesions the tumour came away in the hand, there being no pedicle to tie. The etiology of the condition was apparently that the tumour had undergone axial rotation of a gradual nature during a previous pregnancy, and had become vascularised through adhesions subsequently formed.

(*c*) LARGE DOUBLE PYOSALPINX, removed from a patient aged 32, who had complained for some months of pelvic pain and who had an *abdominal* tumour extending about three fingerbreadths above the pelvic brim, which could be felt extending into the posterior fornix and pushing the uterus forward. Its semi-solid consistence and partial fixation led to the diagnosis of dermoid. On opening the abdomen, however, the tumour was found to be composed of two enormously distended tubes, the right being considerably bigger than the left. They were full of caseous material, apparently tubercular, but sterile on pathological examination.

(*d*) CERVICAL CANCER, removed by vaginal hysterectomy from a patient aged 50. The patient had had one child about seven years before, and the labour had been very severe, partly owing to rigidity of the soft parts and contracted pelvis. The cervix was very severely lacerated, which no doubt was a predisposing factor. The condition was diagnosed in its early stage, and the disease was thoroughly removed by the vaginal route.

(*e*) UTERUS removed by vaginal hysterectomy for sarcomatous infiltration of a submucous fibroid. This specimen was interesting, in that the patient, on three previous occasions, had had submucous fibroid polypi removed which were apparently simple in their nature. In August last a simple fibroid was removed *per vaginam* from the uterine cavity, after splitting the cervix so as to gain free access to the growth. The whole of the interior of the uterus was thereby exposed and the tumour was removed completely, leaving apparently an absolutely healthy uterus. The report of that tumour showed it to be simple. In October last (two months after the uterus had been emptied as above), the patient returned with pain and hæmorrhage again, and another fibroid was found lying over the internal os. It had a broad base, with no tendency to pediculateness, and as the patient's health was seriously affected, it was decided to remove the uterus entire, which was also the patient's urgent wish. The specimen shows the wisdom of this procedure, as it will be seen that it would have been impossible to have safely removed the tumour alone; further, the microscopic report by the pathologist shows commencing sarcomatous infiltration at the base of the tumour. Since the operation the patient has improved markedly in health, and has put on weight.

(*f*) PAROVARIAN CYST WITH TORSION OF PEDICLE, removed from patient aged 56, who was supposed to have an attack of acute appendicitis. Before admission to hospital she had been seized with violent abdominal pains, with vomiting and rise of temperature. At that time there was said to be no abdominal tumour to be made out. Her abdominal walls were very rigid and fat. After admission to hospital an abdominal tumour was discovered which seemed to increase daily in size. By that time the acute symptoms had ceased. On opening the abdomen the twisted parovarian cyst was recognised, distended with blood, which accounted for the symptoms and for the rapid increase in size of the tumour. The pedicle was twisted three times. It was a right-sided tumour, and had twisted towards the middle line.

(*g*) TWO ECOPTIC GESTATIONS—one recently ruptured and the other removed before rupture.

(*h*) FIBROID TUMOUR associated with pyosalpinx and hydrosalpinx—removed by abdominal hysterectomy. The patient had retention of urine and abdominal pain. For these reasons a hysterectomy was performed, and in the course of the operation a pyosalpinx on the left side and a hydrosalpinx on the right side were discovered.

## VI. THE PRACTICE OF ARTIFICIAL INFANT FEEDING.

By A. DINGWALL FORDYCE, M.D., F.R.C.P.E., Extra-physician, Royal Hospital for Sick Children, Edinburgh.

IN no other department of medicine are the broad principles which underlie and serve as a basis for the whole superstructure of the art and practice so commonly overlooked and neglected, as in the department of infant feeding. In no other specialty is the personal equation more apt to be ignored; in none is the patient more frequently treated as a case and not as an individual entity; and in none does blind routine procedure hold such sway.

The subject of infant feeding is frequently considered uninteresting, because unknown or misunderstood; unworthy of earnest consideration because, forsooth, the infantile digestive capacity in health is wide and broad. And yet the subject is one fraught with the gravest issues. If we consider the rate of infantile mortality in this country—the preventable infantile mortality—if we realise the facility and rapidity with which death accrues in cases where the boundary lines of digestive health are passed; if we bear in mind that during the first year of life, the body weight is trebled, the various senses are developed, the foundations of the osseous system are determined, the coherence and co-relation of function of all the various systems throughout the organism are initiated; and if we appreciate the liability to organismal infection, the facility of bacterial invasion by means of the alimentary canal, and the supreme predisposing power which the nourishment exercises over such infection—we cannot but recognise the enormous influence which feeding in infancy exerts over health and disease, life and death, not only during infancy, but throughout the whole course of an individual's life. So much it may be contended is matter of common knowledge, of universal acceptation, and the mere hackneyed reiteration of the trite commonplaces of general elementary medical knowledge. Admittedly so.

But though the infantile digestive capacity be wide, we surely must in each particular case seek for the optimum diet; theory and practice are not one and indissoluble; for the attainment of a satisfactory issue well-regulated and judicial theory must be backed up by consistent practice, and practice must be guided by the general principles of scientific medicine.

And yet it is matter of everyday experience that something has gone wrong in the reflex arc of the science and practice of infant feeding in the case of only too many practitioners. The rift may be in the centripetal influx of knowledge, in the centrifugal course of its application, or in both. With those cases in which extraneous, subsidiary, but potent centres closely related to the baby exert a baneful but all-powerful influence over the actions of the physician, I have naturally nothing here to do.

Sound theory is the *sine qua non,* and to sound theory it is the common privilege of us all to attain. Why reasoning creatures, scientifically trained members of the medical profession, should so frequently throw reason to the wind and indulge in all the vagaries of a disordered mental equilibrium when confronted with the charge of an infant's nourishment, is a fact sufficiently bewildering to pass comprehension, were it not for the possibility of lack or inaccuracy of knowledge on the subject.

The subject to the student is awesome and fearful; as a neophyte he thinks in percentages and dreams of varieties of proteid; his whole soul is absorbed in minutiæ; his sense of proportion wanes as his appreciation of comparative trivialities increases; and the weeds of a too luxuriant growth of details exclude the illumination of broad-principled reasoning.

The subject has become encircled by an altogether artificial ring of difficulties and distractions.

The question of diet at all ages is a large one, and the problem difficult to solve; but in infancy the subject, while of supreme importance and controlled by laws corresponding to those in adult life, is curtailed in latitude, and consequently correspondingly simplified and limited in its sphere of consideration.

The diagnosis of the exact dietetic cause and metabolic alteration going to produce the symptoms in any one particular case must of necessity, in the great majority of cases, remain of a more or less vague and ill-defined nature.

To focus this diagnosis as sharply as possible, the resources of clinical medicine have to be extensively employed, and more particularly the greatest of all, accurate observation. In very many conditions in childhood, symptoms are more valuable aids to us than signs, and, I might almost say, impressions than conclusions. The greatest asset of any physician, I think it will be generally admitted, and I personally profoundly believe, is the possession of medical sympathy, medical intuition, or, in other words, the trained capacity of sub-conscious, accurate, deductive, reasoned but unreasoning observation. By this I mean the sub-conscious capacity to interpret aright signs and symptoms incapable of accurate definition, which appeal to no one particular sense, which are accepted as existing by none but those suited to absorb them, but which in such persons indefinably affect and profoundly impress what one may for want of a better term call the medical centre. This sub-conscious power undoubtedly exists in very varying degrees of perfection; it is in every case capable of immense development, and it is only reliable and valuable when carefully developed by accurate observation and founded on accurate knowledge.

In cases of disorder of infantile digestion, accurate knowledge is of course, as in all cases at all ages, essential, but in addition I think it is advisable to lay stress on the importance of accurate observation.

In infancy very much depends on what may be termed "mere" observation and care in examination, and yet it is precisely in cases of infantile digestive disorder, in which such ordinary methods are frequently so valuable, that very often the examination is superficial and the diagnosis consequently so extremely vague as to be nothing more than the definition of the principal symptom.

Successful treatment, fortunately, very frequently is achieved in the absence of even an approximately accurate diagnosis, but such results can hardly be recorded as the achievements of scientific medicine.

As arbiters of the nourishment to be supplied to an infant, we are the fortunate possessors of more or less accurate knowledge as to the natural diet which must be taken as the standard.

In connection with the subject of infant feeding, various distinguished authorities have at different times elaborated procedures along different lines; by the recommendation of novel admixtures, important steps in advance have been made; and with a sigh of thankfulness for an authoritative statement on the subject, clear to the meanest intelligence, the particular doctrine is accepted, and by a certain number of the profession its practice is not only used but most thoroughly abused.

All theories are applicable in particular cases, subject entirely to the individual requirements and capacity; Budin did not recommend whole milk for all babies at all ages; Poynton did not use citrate of soda absolutely indiscriminately. The interrogator who queries, "Do you believe in Nestlé's milk?" "Do you believe in barley water or plain water?" and so on, thereby absolutely stultifies himself.

It is a striving after the impossible to attempt to lay down rules applicable to the artificial rearing of every infant: on the addition to well-defined principles of accurate individual observation and examination, all dietetic treatment must essentially depend.

That it is *necessary* in so many cases to have recourse to artificial feeding is, I think, extremely questionable. By means of careful treatment of the mother or baby or both, and with the co-operation of a willing mother, many lactations would be continued which, however, are summarily stopped; on the other hand, we are, I think, justified in saying that a healthy baby will thrive normally when weaned at any age, and even a weakly baby will do well.

In order to approach as closely as possible the constitution of the standard food—natural milk—it is obviously pre-eminently desirable that milk of some kind should be employed as the substitute, and of fresh milks that of the cow is by far the most readily obtainable.

It would seem almost an impossibility to convince mankind in general, and certainly the feminine section of it, that cow's milk alone is wholly sufficient nourishment for a healthy baby up till the period of the first dentition.

Condensed milks, gruels, malted and unmalted foods, proprietary foods of all kinds, are invested in the lay mind—and certainly not exclusively in the lay mind—with mysterious beatific properties: they "satisfy" the baby's hunger, they quiet his cravings, they fatten his body and, presumably, develop his soul, and if digestive disturbance does occur during their employment, it certainly would have occurred sooner and been of a more severe nature had he not been so fortunate as hourly to suck in the vivifying fluid as supplied by the excellent firm of Messrs So-and-so! A most comfortable reflection for kindly solicitous adults of moderately developed reasoning powers, but a somewhat equivocal position for that speck of digesting humanity—the unreasoning infant. The use of these foods or mixtures in the vast majority of cases is an open avowal of ignorance.

I am well aware that many physicians of extensive practice and wide experience constantly employ proprietary foods—in the main along with cow's milk—and I can very well believe that in a great many cases the results are most excellent. Where these excellent results *are* obtained, however, they must be ascribed, I think, to the excellence of the medical sense of the physician, and to his store of practical experience. No man obtaining such results can give this or that food indiscriminately. Experience, I imagine, enables him to comprehend the probable digestive capabilities of various infants, and by experience his dietetic régime is ordered. Be it so. But it does not necessarily follow that, because his results are good, his method of feeding is the only one and the best. Such sub-conscious medicine *when successful* can only be directed by experience, and its indulgence during probationary periods is bound to produce discordant results.

Where experience is lacking, observation and scientific principles must wholly regulate our conduct; in all cases their importance must be pre-eminent. In the delicate subject of the artificial rearing of infants we strive for the optimum result, and we consequently must surely strive to know as accurately as possible the means by which that result is to be attained. Simplicity in things dietetic and therapeutic is universally desirable, and in infant feeding is of the utmost necessity if we are on any particular occasion to put our finger on the cause of any special condition. Eminent authorities on the subject tell us that a teaspoonful of some particular infant food is equivalent to a drachm, and on this we may base our conclusions for the diet; others again tell us that this same teaspoonful is really equivalent to two drachms or three drachms. The greatest amount of accuracy possible cannot be compared with the only comparative accuracy of the constitution of cow's milk. By the requisite adjustment of the constituents of cow's milk, by the suitable proportionate admixture of milk, whey, cream, milk-sugar, and boiled water, we can in the case of a healthy baby altogether obviate the necessity for the addition of extraneous material to it except for therapeutic purposes.

The possession by cow's milk of the anti-scorbutic principle is a fact with which is intimately connected the important question of the heating of milk.

With our present defective supply of milk, heating of some sort is a practical necessity; bacterial impurity necessitates action; and by means of the procedure of scalding, we obtain, I think, the highest level of excellence when taking into account both the advantages and disadvantages which result from the various grades of heat.

Scalded, I say, rather than pasteurised, because the procedure is more simple; because as a result of its application the tubercle bacillus is killed, which is not the case with pasteurisation; and because with it the disadvantages dependent on alterations in the milk associated with the application of increasing degrees of heat are practically of a negligible quantity as compared with those of pasteurisation. Scalded rather than "sterilised," because as a rule the latter procedure is, from the bacterial point of view, totally unnecessary, and the application of the minimum satisfactory degree of heat must be our aim.

Two of these reasons I am well aware are open to adverse criticism. Firstly, is the tubercle bacillus killed by exposure to a heat of rather over 100° C. for about a minute? Secondly, is thorough sterilisation totally unnecessary?

The two, I think, may well be considered together. A very large amount of experimental work has been done on the action of heat on the virulence of tuberculous milk, and it is quite impossible to enter, even superficially, into the subject. I must restrict myself to stating that, from an analysis of the literature, I find that by some authors, exposure of tuberculous milk to a temperature of 80° C. for one minute is found sufficient to kill this bacillus; that by the majority, exposure to a temperature of 100° C. for one minute is satisfactory; but that it has not infrequently been found that even considerably higher temperatures were inefficient.

I am, therefore, forced to concede that scalding does not necessarily kill the tubercle bacillus; but I certainly contend that the virulence of the bacillus is thereby immensely diminished. Calmette of Lille has proved that for infantile tuberculous infection to occur from the alimentary canal it is essential that the infecting germs be in immense numbers and constantly present; that, in fact, the resisting power of the infantile organism is, comparatively speaking, extremely high. Tubercle bacilli are almost certainly very frequently present in milk; in the great majority of cases they are present, however, in comparatively small numbers, as it is only in cases of marked disease of the bovine udder in which they abound. By the procedure of scalding, and owing to the consequent loss, or *at least* diminution, of virulence of the bacillus, a satisfactory safeguard is, I think, raised against tuberculous infection from this source.

From the bacterial point of view scalding is therefore a satisfactory procedure; how about the chemical point of view? Is there any object to be gained by subjecting milk to higher temperatures?

The outstanding characteristic of milk which has been exposed to a temperature of at least 100° C. for some considerable time is its diminished reaction with rennin, and the consequent toleration by the infant of abnormal amounts of proteid. Is it desirable that the infant be provided with a milk, comparatively speaking, extremely rich in proteid?

The teaching of the French school, and more particularly the writing of the late Professor Budin, has of late years influenced to no inconsiderable extent the opinion of many physicians in this country, and a certain degree of fashion has arisen in the belief in pure milk. In Paris and throughout France pure milk is given very largely and to the youngest infants with marked success. But an extremely important point, and one very frequently overlooked, is that this pure milk is always treated for three-quarters of an hour at a temperature of at least 100° C. As a consequence most important changes take place in the milk, which alter very materially its reaction with the digestive juices. Thus, owing to the large precipitation of calcium salts, the action of rennin is very greatly delayed, and it appears probable that much of the still liquid milk passes through the pylorus before curding can occur. The work of digestion is consequently very largely relegated to the intestine, the part of the alimentary canal which in early infancy is most adequate to cope with it, and the formation of dense rennin coagula is largely prevented. As a consequence also it is probable that an amount of proteid greater than is necessary for full nutrition can be borne without causing digestive disturbance. The fluid also has the advantage of being sterile, but loses a certain value as a fat and sugar carrier. The chief points obviously to be considered in this régime are—(1) The degree of heat applied; and (2) The contention that this fluid in cases where it is satisfactory stood is, in varying amounts for infants of different ages, the food *par excellence* for the infant; that is to say, that it is preferable to give this fluid rather than modifications of milk which more closely approximate to the standard of maternal milk, even in cases where these latter may prove satisfactory.

While considering these points, it is, however, essential to turn our attention in a totally different direction.

Simultaneously with the development in France of a distinctive French school of infant feeding there has developed in America a no less distinctive American school. The teaching of the two is widely divergent, in many points totally at variance.

In America a wave of scientific enthusiasm has carried on its crest workers on this subject to a goal of scientific accuracy and scientific detail, wonderful in structure and irresistible in force of logic. In France pressing national perplexities have necessitated cogent remedial measures, philanthropy and medical science and enterprise have joined hands in the humanitarian propaganda, and successful practical results bear witness to the value of well-directed zeal.

In both countries the same object has been in view; but it has been viewed from totally different standpoints, approached by totally different routes, and so far attained by diametrically opposite measures.

It is impossible not to believe that the work in the one country has to a considerable extent affected that in the other; and it is equally impossible, I think, not to recognise that in either case excessive zeal has outrun sober discrimination and broad-minded reasoning. By American authorities the feeding of an infant is a scientific problem, determined by means of scientific minutiæ, and supervised by means of elaborate scientific calculations; in France it is a process subject to a constant law.

The results in the one case may be designated the achievements of science, in the other the teaching of experience. Both obviously are excellent so far as they go; the lessons in the two cases, though widely distinct, are by no means incompatible; and a discriminating admixture of the teaching of the two schools serves to provide us, I think, with that *juste milieu* which is in practice most certain to lead to successful results.

Science and experience cannot be antagonistic; but imperfect science must be used to control imperfect experience, and *vice versâ*. I would therefore say that the scientific principle of percentage feeding—the modification of cow's milk which renders its composition as nearly as possible equivalent to that of maternal milk—must be accepted in general as the logical basis for the framing of infant feeds; that, accepting this fundamental principle, it has to be recognised that, practically it cannot be strictly carried into effect in the vast majority of cases; that simplicity in prescription being of the utmost importance, it is yet possible for us to adhere within limits to the principle; but that, as the digestive capacity of infants varies greatly, and may more particularly vary as regards cow's milk, this principle is one which in each particular case must be entirely subservient to clinical observation and individual idiosyncrasy.

Grounded on such theoretical basis, I contend that scalded cow's milk, modified according to age and the digestive capacity, is the proper artificial food for the infant.

When we consider the very varying digestive capacities of different infants in different directions, it is clear that no rules can be formed which will dictate the treatment in any particular case, and yet it is highly desirable and obviously advantageous that the treatment of all cases should be regulated by the same fundamental principles. And, in the first place, if the question of the infant diet is to be a question of medical determination, the ordering of this diet—its prescription—must be along businesslike and professional lines, and not more or less haphazard. There is always an advantage, surely, in knowing what you are doing, whether you know why you are doing it or not. The exact amount of nourishment swallowed daily by the infant can hardly ever be accurately known by the physician—too many subsidiary factors enter into the question—but in only too many cases even the approximate amount is absolutely unknown. When such is the case, if digestive disturbance arises, theories as to the original cause of this disturbance must be chaotic, and therapeutic treatment consequently starts at a disadvantage. Strict accuracy in the ordering of dietetic treatment in infancy is no less essential than in drug treatment in adults. We *must* know the nature and amount of food we give the baby in twenty-four hours, the amount ingested at each feeding period, and the intervals between the periods. We must accordingly give our orders distinctly, definitely, and in writing, in somewhat the following form:—

$$\left.\begin{array}{l}\text{4 Tablespoons milk}\\ \text{2 Tablespoons boiled water}\\ \text{1 Teaspoon cream}\\ \text{1 Teaspoon milk sugar}\end{array}\right\}\text{Scalded}$$

in each bottle. Each feed to last fifteen minutes. An interval of two and a half hours between each two bottles during the day. Seven bottles to be given during the day, and two at night.

Such a prescription naturally is merely temporary; with the growing capacity and growing needs of the infant additional nourishment is necessary. A new prescription is constantly necessary—it may be weekly, it may be more frequently. It certainly ought to be necessary weekly. Along with growth of the stomach and development of the digestive capacity generally, food which was suitable one week should certainly be inadequate the following; if such is not the case, either the baby is unhealthy or it was formerly getting too much nourishment. I fail to see any reason whatever for supplying nourishment to the infant in excess of its requirements, and the advantages of restricting the amount well within its digestive capacity are, I think, overwhelming. Its digestive capacity is wide, but it is unwise to approach too closely the maximum boundary line when equally satisfactory results can be obtained with the expenditure of a slighter degree of digestive energy, and consequently with a wider margin of safety.

In the case of healthy babies increase of the food must be gradual; increase in strength of a feed and of the amount of a feed may, however, be contemporaneous.

On the occurrence of acute or chronic digestive disturbance, on the other hand, the diminution of the food constituents must be sudden and thorough. Digestive rest is the imperative indication, and starvation for a short period is well borne in infancy. In acute cases all food must be stopped for four, six, eight, etc., hours, and then nourishment commenced at the lowest limit of the gamut. In chronic cases the descent must be equally sudden but the degree more moderate, our aim being to administer a simple food of simple known constitution, which, in our opinion, will prove well within the disordered digestive capacity, and which at the same time will permit of the determination of the nature of the food stuff in connection with which difficulty arises.

In both acute and chronic cases increase of food both in amount and nature must be extremely gradual; increase in the amount and quality of a feed must *never* take place simultaneously; and new ingredients in the food, such as cream and sugar, must at first be added in the very smallest quantities possible.

(I do not include in the above title of acute cases slight digestive disorders of a healthy baby where, after thorough emptying of the alimentary canal, the general condition is not seriously, if at all, affected.)

In the consideration of the method of increase valuable information is supplied us by examination of the stools.

Below I append a rough scheme of the dietetic progression in such cases, in which, however, I have omitted all questions of intervals, amounts, and strengths, as these depend on many varying factors.

### *Dietetic Progression.*

1. Saline transfusion (brandy).
2. Albumen water ( „ ).
3. „ „ and whey (brandy?)—gradually increase the amount of whey till it is pure.
4. Whey and cream (brandy?)—gradually increase the amount of cream.
5. Dilute fully citrated milk (or peptonised milk).
6. Gradually diminish degree of dilution and amount of citrate separately, and gradually and separately add cream and milk sugar.
7. Plain milk.

Closely connected with this subject is the question of the method of alteration of the infant's dietary.

It not infrequently happens that an infant is found to be living on an unsuitable diet, and marked alteration in the régime is essential. In such cases there are, I think, four main lines of treatment open for adoption.

### *Alteration of Diet.*

1. Immediate stoppage of diet in use and substitution of suitable diet.
2. Alternation of feeds with diet in use and diet recommended.
3. Immediate stoppage of diet in use and commencement at lower rungs of nutritional ladder.
4. Gradual replacement in each feed of diet in use by diet recommended.

Of these four methods the first two are not likely to meet with success. Variation in the composition of infant feeds not infrequently is of considerable value—variation, that is, of the proportionate amount of the constituents in each feed. But the alternation of foods of altogether different nature is a much less valuable method of procedure, and certainly in cases where there has been the previous administration of unsuitable food, and digestive activity is consequently in a somewhat unstable condition, such a method is inadvisable. Methods 3 and 4 are, I think, more rational. When the infant is comparatively strong and well, an immediate diet descent, even so far as to albumen water, is well borne and suitable feeding gradually attained. In very many cases, however, this procedure is altogether unnecessary, and in very weakly infants is frequently most undesirable, and in such cases method 4 leads to most successful results.

On the subject of drugs I shall not linger. Where possible they are to be avoided and the desired result gained by alterations in the constitution of the food: by the addition of cream or olive oil, by the administration of a little sugar and water before the feed, and so forth.

In passing to the consideration of the diet in connection with various types of infants it is, I think, first of all desirable to consider the case of a healthy baby hand-fed from birth.

To a healthy baby hand-fed from birth I gave scalded modified milk, commencing in the first week of life with one tablespoonful of milk and two tablespoonfuls of boiled water for each feed, and gradually increase the amount and strength of each feed as age advances, as the digestive capacity increases, and as the weight curve and general clinical condition indicate. It is certainly wise, I think, to begin with this simple mixture of milk and water; small amounts of sugar and cream can in the great majority of cases very quickly be added and increased with due precaution; but as every case of artificial infant feeding must be considered in its initiation more or less of a dietetic experiment, it is essential that the first step be as simple as is compatible with satisfactory nutrition. For the same reason it is wise, when an infant previously on the breast is to be weaned, that such simplicity should again be observed. Where possible the process of weaning is a gradual one, the first substitute food for infants under three months of age or 12 lb. in weight being one part of milk with two parts of water, and for older and heavier infants equal parts of milk and water. In both cases the amount of each feed is, of course, approximately to be suited to the gastric capacity for the corresponding age, but the strength of the food can, in the majority of cases, be very rapidly increased. Where the process of weaning is of necessity abrupt the same regulations hold good, with this important proviso, namely, that the infant has in addition to maternal milk received no extraneous food.

Where feeding of any kind has been indulged in along with maternal nursing I think it is well to be even more on our guard in the process of weaning, except in those extremely rare cases in which we can be absolutely sure that the substitute feeding has in every particular been of a satisfactory nature.

As a rule, it is advisable to citrate the milk in these cases, either fully by the addition of 2 grs. of sodium citrate to each oz. of milk, or partially with 1 gr. to each oz., according to the amount and nature of the artificial food or foods previously administered. By such treatment we prevent in the one case and diminish in the other the possibility of the occurrence of trouble due to unwonted curds in a probably unduly susceptible alimentary canal.

In most instances the proportionate amount of citrate in each feed can, as a rule, be quickly reduced in amount and ultimately omitted, either by gradually withdrawing it from the food, or by increasing the amount of milk, where such a procedure is advisable, and keeping the amount of citrate stationary, and then gradually withdrawing the citrate. It is certainly not advisable to continue the administration of citrate longer than is necessary. The disadvantages of its prolonged employment are marked constipation, a very definite difficulty in stopping its administration without causing digestive disturbance, and in certain cases some evidence of diminished increase of growth, as demonstrated by the weight curve.

For babies previously hand-fed in an irregular and consequently unsatisfactory manner, but who nevertheless display no symptoms of marked digestive abnormality, citrated milk is again the most satisfactory initial step towards a well-ordered regimen.

Peptonised milk or milk and lime water, it may be contended, are equally satisfactory. As a rule they are not; in certain cases they are more so. Where thorough peptonisation of the milk is required previous to its administration to an infant of moderate general well-being, previously fed on some proprietary food or condensed milk, the very fact of the necessity of this procedure proves the necessity of a period of thorough digestive rest. It is important, I think, to recognise that in babies who do not suffer from any acute digestive trouble digestive rest may be advisable for one of two chief reasons.

In the first place, with a normal digestive capacity, for some extraneous reason (post-operation cases) it may be advisable while supplying suitable nourishment to diminish the amount of expenditure of digestive energy; or, again, the digestive capacity may be approximately normal in nature but diminished in amount (as, for example, in cases of acute illness not connected with the digestive system). In such cases peptonisation of the milk is temporarily advisable.

In the second place, the digestive powers through long-continued misuse may have become perverted, the powers in one direction having been taxed to the utmost, while in other directions no stimulus to development has been afforded.

Such are the cases we are at present considering, and, in the great majority of them, I think citrated milk is advisable.

In these cases it may be taken for granted that the capacity of digesting a reasonable amount of sugar is good, as the infant is in moderately good health, although having been fed almost certainly on a diet excessively rich in carbohydrate. Fat and proteid have probably been deficient in the diet, but by commencing our dieting with diluted milk we begin with a small proportion of fat, which, in the first place, is probably no greater than was previously being administered; and, in the second place, even if it is, it is present in a quantity readily digestible by even a weakly infant. As regards the proteid, the powers of proteid digestion almost certainly require development. Pre-digestion of the food would be a hindrance to development, but by the citration of a mixture in its initial stages poor in proteid we encourage proteid digestive energy, while at the same time holding in check rennin activity, and consequently guarding against the occurrence of gastro-intestinal disturbance due to the mechanical action of unaccustomed massive curds on an excitable mucous membrane.

On the subject of the comparative value of citrated milk and peptonised milk in different varieties of cases, it is, of course, only possible to speak in very general terms; in many cases one may be as satisfactory as the other.

Even where there is no marked diarrhœa or vomiting in cases where the method of feeding has been irrational, the baby is frequently found to be extremely ill-nourished and weakly. A slight amount of vomiting or regurgitation is almost certainly present; but it is not, as a rule, a serious symptom, and may even be beneficial. A tendency to diarrhœa may be present, or, on the other hand, constipation may be complained of.

Such babies are suffering from more or less severe degrees of malnutrition. The cause is occasionally insufficiency of food; as a rule it is the administration of improper food, usually at improper intervals. The degree of wasting is frequently so severe that the baby is literally a bag of skin and bones. Yet this is no true marasmus. Marasmus, as I take it, is a condition of congenital digestive incapacity, an inability to respond to the growing needs of the organism, by furnishing it from the alimentary canal with a suitable nutritive fluid. A digestive incapacity, not a perverted or disordered digestion; an incapacity originally altogether independent of the nature of the food supplied, and not a sequel to maladministration.

Rotch states that "primary infantile atrophy—marasmus—is extremely rare," and the condition is one which obviously lends itself to the exploiting of various methods of feeding, and consequently when such cases are seen at an advanced stage, it may be impossible to say that the baby was not originally marasmic.

But a *certain positive* diagnosis is, I think, an extreme rarity.

In the cases of babies suffering from extreme malnutrition, milk as milk should be avoided at least for some days.

It is impossible to be dogmatic further.

As a rule it is advisable, to begin with, to ensure the thorough removal from the alimentary canal of the remnants of previous food. According to the degree of weakness of the baby, stimulants may or may not be required. The two primary indications are to sustain the infant's strength, and to supply a simple food fitted for ready digestion and assimilation, which may serve as a step to a food of higher nutritive value.

It may be necessary to commence with albumen-water and brandy; it may be advisable to commence with whey and cream, or sherry-whey may seem the most suitable substance.

Our advance in the nutritive value of the food must be carefully guarded by observations of the clinical conditions, and more particularly by the nature of the stools; the advance may be slow or it may be rapid, but in every case it must be step by step. Where diarrhœa or vomiting, or both, have been for some time associated with the condition, the rate of progression must be extremely slow, and new constituents must be added in minimal quantities. Thus cream or sugar must originally be added by the half-teaspoonful, however old the infant.

Where an acute attack of diarrhœa and vomiting is superimposed upon long-standing digestive disorder, after the initial period of digestive rest, lactated milk is temporarily of value in those cases in which the disorder is primarily associated with excessive bacterial action, as evidenced by clinical symptoms (toxæmia, temperature, etc.) and the stools. Where this method of dieting is employed in preference to other dietetic methods, it is wise, I think, to restrict the duration of its employment so far as possible. A habit of toleration of this milk is gradually acquired from which it is occasionally difficult to wean the infant, and, consequently, gradual alteration of the food according to the methods previously mentioned, should be brought about as early as possible.

In cases of acute infective summer diarrhœa more especially is this form of milk valuable in both cases—where the infant previously was properly and where it was improperly fed—as in such cases it occasionally permits of stronger nourishment being early given to the infant than could otherwise be the case.

Of treatment in cases of organic disease, I have but little to say; it is impossible to enter at length into each separate condition, and it is valueless to generalise.

In all acute infective conditions, in all conditions associated with high temperature, we have to bear in mind the particular effects associated with digestion, its diminished capacity, and the corresponding value in many cases of previous peptonisation of the milk.

In conclusion, I would particularly note that in the foregoing remarks I have restricted myself rigidly to dietetic treatment. I have touched lightly or not at all upon the administration of drugs, enemata, stomach-washing, nasal-feeding, and so forth. In many instances, however, such treatment is intimately bound up with the dietetic treatment.

In the main the great *desiderata* in infant feeding are exactitude and method; method, rational or irrational, is a *sine qua non.* That man who, having devised or accepted some method as the one which appears to him most worthy of adoption, carefully regulates his practice according to this method is, I think, however unsatisfactory his results may be, worthy of all esteem.

The conduct of the man who lacks a method, who flits from one food to another—from peptonised milk to a proprietary food, from this to albumen-water, and so on—without definite rhyme or reason, is, on the other hand, absolutely inexcusable. His fitness for the care of infants is infinitesimal, and his position as mentor and adviser to the guardians of the children is fraught with the greatest danger to the patients themselves; his advice cannot but be pernicious to the interests of scientific medicine and the dissemination of rational knowledge on the subject among the laity, and consequently cannot but serve to bring discredit on the whole art and practice of infant feeding.

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*The President* thanked Dr Dingwall Fordyce for his most interesting paper, and remarked on the great importance of the subject. From his own clinical experience and observation he had found how true were the conclusions of Dr Dingwall Fordyce, which had been arrived at scientifically.

*Dr James Carmichael* regretted that he had not been present from the commencement of the paper, the subject of which, owing to its wide scope, was difficult to discuss. It was highly important to bring the subject of the feeding of infants before such a Society. He believed that his own paper, read twenty years ago, had been the last contribution to the subject presented to the Society. What advances had been made in the meantime with regard to the feeding of normal babies? There had been very little change during twenty-five years, because there was only one substitute for mother's milk, and that was modified cow's milk. The principle they must go on is that mother's milk must be imitated as closely as possible. As it passes from the breast direct to the child's mouth, the mother's milk is aseptic, and a living fluid. He believed that it contains a vital principle which is also contained in cow's milk, but is destroyed by processes like peptonisation, and is absent from all the proprietary infant foods. All proprietary foods are bad, and should be condemned. He himself, after a large experience, was satisfied with cow's milk. Fresh cow's milk, properly modified, never failed him. Obstetricians should all understand the principles of infant feeding. If the patients were left to the nurse, proprietary foods were selected. These apparently do no harm at first, but what of the future? He quoted examples of the harm wrought by proprietary foods chosen at random in this way, adipose rickets resulting in enormously fat children sometimes, and also cases of infantile scurvy. The feeding of infants for the first year was apt to be left too much in the hands of nurses and chemists. It was the doctor's business to lay down the proper lines for the feeding of the infant.

*Dr J. W. Ballantyne* said he had enjoyed the paper very much, and alluded especially to the literary tone of the overture. It contained also a great many interesting facts. There was a great divergence of opinion between the American and French schools. Sterilisation was the usual French method, while the Americans measured the constituents, and had the milks made up after the manner of a prescription. The feeding of premature babies was a great difficulty. Little digestion was done in the stomachs of very young infants: it was mostly intestinal. Much of the difficulty was caused by the presence of unwonted curd in an unduly susceptible intestinal canal. Proprietary foods were always experimental at first, and if they are new it was very important that the effects should be carefully observed. Greater supervision was needed on the part of doctors. Dr Dingwall Fordyce's scheme of dietetic progression was very valuable.

*Dr Elsie Inglis* remarked that in places where the highest infantile mortality was recorded, the need for fresh milk was pressing. There was difficulty in procuring it and in getting the mothers to follow the directions given them. She spoke of the experiments which had been carried out from the Hospice, by issuing pasteurised milk obtained from the depôts in Leith. On the whole they had been very successful. Milk was given out in sealed bottles, and went into the houses free from contamination. Each case had to be considered on its own merits, and here also there was need for careful supervision of the feeding.

*Dr J. S. Fowler* said the most important point was to ensure the sterility of the milk. The difficulty of digesting curd was less important. America started with a ·5 percentage of proteid; France with 3·5. Both appeared to give equally good results; so that the quantity of proteid did not seem very important, and in America the percentage was being raised. Sterilisation of the milk was the great point. Scalding was not so good as pasteurisation, because the facilities of infecting the milk subsequently were enormous. Simplicity of method was the best. Two years ago he had made a series of charts for every kind of milk feeding, and found that by far the most satisfactory curves were those where undiluted milk was the food. He was very well satisfied with undiluted milk, and had adopted Budde's method of preparing it. In three weeks' time he put a new-born baby on undiluted milk. A great point was to keep the feeds on the small side, and, as soon as possible, to lengthen out the intervals between the feeds. This was very helpful, by allowing free hydrochloric acid to accumulate in the stomach between the feeds. Raw, undiluted milk should be sterilised for a long time, to assist in breaking up the curd. Scalding milk alone was not so good.

*Dr James Ritchie* differed in some details from Dr Dingwall Fordyce's views. He had tried the French method, but failed to get good results. He had no hard-and-fast rule of feeding, and did not think that one stereotyped method would do. Sometimes it was necessary to try various things until what would answer best should be discovered. He generally tried two parts of water to one of milk, after the first day or so, and then gradually increased the proteids, and added a little cream. The most healthy children were often the most difficult to bring up in weight. Undiluted milk probably agreed soon with strong children. The presence or absence of flatulence and of curd in the stools influenced his treatment. Buddeised milk was said to be the greatest advance in milk preparation. He had not tried it, but would like to have the opinion of anyone who had done so. He agreed with Dr Dingwall Fordyce that the addition of lime water was not good.

*Dr C. M. Pearson* remarked that in the discussion of artificial feeding of infants, it was important not to forget the great fact that mother's milk was undoubtedly the best food for infants, and he dwelt on the importance of urging mothers to adopt the method of breast-feeding in all cases where it was at all possible.

*Dr Dingwall Fordyce* thanked the Society for the manner in which his paper had been received, and replied briefly to one or two of the points raised. He had not meant that a hard-and-fast rule could be laid down, and obviously it was impossible to make the sweeping statement that all proprietary foods were bad. In answer to Dr Fowler's remarks, he alluded to the method of sealing bottles after scalding the milk, in order to prevent contamination.

## MEETING III.—JANUARY 8, 1908.

PROFESSOR STEPHENSON, *President, in the Chair.*

I. The following gentleman was elected an Ordinary Fellow of the Society:—J. Nigel Stark, M.D., F.F.P.S.G., 4 Newton Place, Charing Cross, Glasgow.

II. *Dr Freeland Barbour* showed a SPECIMEN OF A TELANGIECTATIC FIBROID removed by hysterectomy. This presented the rare occurrence of spaces in the substance of the tumour containing blood. A section under the microscope revealed that the spaces were lined by endothelium, showing that they were not merely blood extravasations into a fibroid.

III. *Mr N. T. Brewis* showed—(*a*) TWO EXAMPLES OF ENDOTHELIOMA of the ovary removed from the same patient. The patient was a nullipara, aged 55, and complained of a thin yellow discharge, and later of a discharge of blood, so that she thought her menstrual periods were returning. She grew very thin and weak. A large, firm tumour, which was fixed, filled the pelvis and projected into the lower abdomen. On opening the abdomen, the left ovary was found to be converted into a large semi-solid tumour, the solid portion occupying about one-third of the tumour, and being firmly adherent in the pouch of Douglas. On section, the cystic and the solid parts are well seen; the cystic portion presents, more or less, the appearance of a degenerated, multilocular cystoma, while the solid portion is hard and resembles cartilage. The right ovary was also adherent and very irregular in shape, hard in consistence, and, with the exception of a small cystic portion on the surface, solid throughout. The tumour is bilobular, the lobes being connected by a narrow neck of firm tissue. On section, the ovary shows the same appearance as the solid part of the other ovary. On microscopical examination, both ovaries were pronounced to present the characters of an endothelioma. The patient recovered well from the operation, but, from the close connection of the tumours with the peritoneum, the prognosis as to recurrence is not favourable.

(*b*) ENDOTHELIOMA OF THE CERVIX, removed from a patient aged 39, who had had six full-time pregnancies and one abortion. The patient complained of pain in the back and left side, and of a dirty, brown, offensive discharge. On examination, a large, cheesy, friable mass was found growing from the left side of the anterior lip of the cervix. The disease extended up and into the left broad ligament. The body of the uterus was mobile, but the lower portion was fixed. The pathologist's report was Endothelioma of the Cervix. A probe was passed into the left ureter and an extensive vaginal hysterectomy was performed, tubes and ovaries being removed as well. The affected tissue in the left broad ligament was dissected out. The patient made a good recovery from the operation. Had the disease been epithelioma, the case would not have been considered suitable for operation.

(*c*) MALIGNANT CYSTIC TUMOUR OF THE RIGHT OVARY AND SOLID MALIGNANT TUMOUR OF THE LEFT. The patient was a nullipara, and the menopause had occurred five years before. She was very thin and emaciated, a cystic swelling occupying the abdomen to a point three and a half inches above the umbilicus. The tumour was removed entire. The left ovary was enlarged and of a stony hardness, and was removed along with the tube. Large papillary-like nodules were found growing from the pelvic peritoneum. A section showed the interior of the tumour to be occupied by a number of papillomatous growths. The pathologist reported the specimen to be a malignant papillary adenoma.

(*d*) MALIGNANT ADENOMA OF UTERUS AND OF OVARY. The patient, a nullipara, aged 50, complained of severe attacks of pain in the lower abdomen, and a constant hæmorrhagic discharge which had been present, more or less, for several years. On examination, the uterus was found to be enlarged. The lower abdomen was occupied by a semi-solid tumour, which was firmly fixed and occupied nearly the whole of the upper part of the pelvis. The uterus was curetted, and the scrapings thus removed were pronounced malignant by the pathologist. The tumour was removed along with the uterus. The patient made an uninterrupted recovery. The ovarian tumour is irregular in shape and semi-solid in consistency. On section, the interior presents the appearance of a malignant tumour. The pathologist reported that the tissue was part of a malignant glandular tumour, there being present fibrous stroma with numerous acini, lined by columnar epithelium.

(*e*) UTERUS, THE SEAT OF FIBROIDS, AND LARGE INTRALIGA-

MENTARY OVARIAN TUMOUR, removed from the same patient. The patient, aged 56, stated that six years previously she had noticed a swelling in the lower part of the abdomen. It was slightly tender to the touch, but otherwise painless. When first noticed, it was about the size of a closed fist; but the patient had no idea of the rate of growth. She was troubled with a constant dribbling of urine. The whole abdomen was very much swollen, symmetrically; the maximum fullness being three inches below the umbilicus. The abdomen was quite fixed and motionless on respiration or palpation. The swelling, which filled the lower abdomen, was not of uniform consistency. At one point, to the right of the middle line, it was of a board-like hardness; to the left, there was a very soft fluctuating area, which was exceedingly tender, the rest of the tumour being more cyst-like than hard. Pan-hysterectomy and ovariotomy was performed. The measurements are: greatest circumference, 3 inches; below the umbilicus, 37 inches; at the umbilicus, 35 inches.

(*f*) ADENO-CARCINOMA OF THE UTERUS AND A MALIGNANT OVARIAN TUMOUR, removed from the same patient. The patient, aged 48, a nullipara, complained of constant hæmorrhage. She had felt quite well up till within two weeks of admission, when, after three weeks of unusual fatigue, she began to bleed freely. The uterus was found to be enlarged and lying to the front; while, immediately behind it, was a semi-solid tumour which filled the pelvis. This tumour was found to be involving the right ovary, and was removed along with the uterus and the appendages of the opposite side. The uterus is the seat of the adeno-carcinoma, while the ovarian tumour presents all the appearances of a degenerated malignant tumour. Microscopical examination showed the tissue to have a uniform structure of young, spindle-shaped, connective-tissue cells—a spindle-celled sarcoma. The convalescence of the patient was uneventful.

(*g*) A LARGE SOLID DERMOID TUMOUR OF THE OVARY, simulating fibroid tumour, and causing retention of urine. The patient, a nullipara, aged 37, complained of occasional attacks of retention of urine. A large solid tumour was found growing chiefly in the pelvis, elevating the uterus. At the operation this tumour was found to be a large solid dermoid, containing hair and pultaceous matter. It weighed 2½ lb., and measured 18 inches in the long axis and 14 inches in the short axis.

(*h*) AN OVARIAN TUMOUR removed by vaginal section during pregnancy. The patient, aged 32, had been married ten weeks. She complained of pain in the left side and back, and of amenorrhœa. The pain had lasted six weeks. The uterus was found to be enlarged to about the size of a two and a half months' pregnancy, while, immediately behind it, was found a small cystic tumour, about the size of a Tangerine orange. The tumour was removed by vaginal section, and the patient made an excellent recovery.

(*i*) EXAMPLES OF HYDROSALPINX AND PYOSALPINX. (1) Double pyosalpinx which had been removed from a patient aged 23, married, with no children. Both tubes and one ovary were removed by vaginal section. (2) Tuberculous pyosalpinx, the tubes having been removed entire by abdominal section, from a patient aged 20. (3) Double hydrosalpinx removed from a patient aged 32, married twelve years, and with no children. The tubes were removed entire, along with both ovaries, by abdominal section.

IV. *Dr R. P. Ranken Lyle* showed—(*a*) A UTERUS REMOVED BY PAN-HYSTERECTOMY FOR MALIGNANT DISEASE OF THE CERVIX, OBSTRUCTING LABOUR AT TERM. The patient was admitted into Newcastle Maternity Hospital, labour having lasted two and a half days. Examination revealed a hard, rigid growth at the base of the cervix, obstructing the birth of the child. Cæsarean section was performed, and a healthy, living child delivered. During the operation the bladder, which was adherent to the cervix, was torn. The opening was stitched, and when the patient left hospital, she had complete urinary control. Six weeks later she was examined, on reporting a loss of urinary control, and two small, hard nodules were discovered in the cicatrix of the vaginal wound. There was also a vesico-vaginal fistula; but the patient would not submit to any further operation.

(*b*) A SPECIMEN OF ECTOPIC GESTATION.

(*c*) A FOREIGN BODY REMOVED FROM THE BLADDER. The patient, believing herself to be two months pregnant, had syringed herself with a hot douche for the purpose of procuring abortion. On withdrawing the syringe, the nozzle was missing, and, being afraid to consult a doctor, the woman remained for seven months suffering considerable pain. On examination, the nozzle was discovered in the bladder, and was easily removed by means of forceps, when it was found to be imbedded in phosphates.

(*d*) A PHOTOGRAPH OF A RARE CONDITION OF JOINED TWINS, known as Ischiopagus Tripos. The case was attended by a midwife. A head presented first, then the arms and legs, folded against the trunk, the second pair of arms and second head following. The twins lived two and a half days, one dying half an hour before the other. The specimen was one of great rarity.

V. *Mr E. Scott Carmichael* showed—A UTERUS WITH CERVICAL CANCER, removed by Wertheim's operation. The patient, aged 51, presented the usual symptoms of cervical cancer. The uterus was mobile in all directions, there being, apparently, no involvement of the parametrium as far as could be judged clinically. The patient succumbed on the seventh day after the operation, there being no evidence of general peritonitis. The specimen demonstrated clearly how inadequate a vaginal hysterectomy would have proved, in a case, clinically, apparently favourable. There was marked infiltration of the parametrium. The case seemed to support the growing evidence that vaginal hysterectomy can rarely be looked upon as a radical operation for cervical cancer.

VI. Sir Halliday Croom showed the specimen from the case which he was about to relate.

## VII. HYPEREMESIS GRAVIDARUM, WITH NOTES ON A FATAL CASE.

By Sir Halliday Croom, M.D., Professor of Midwifery in the University of Edinburgh.

I desire to relate a fatal case of hyperemesis gravidarum which has brought the question more prominently before me at the present time, and afterwards to glance into the etiological factors which bring about this condition in its graver aspects.

On 22nd November 1907, there was admitted to the Maternity Hospital Mrs S., aged 33, primigravida. Her family history was good, and irrelevant except for the fact that her sister suffered from severe hyperemesis at the third month of her pregnancy, which subsequently passed off. Her personal history was good, her menstrual history absolutely normal. She last menstruated in the end of May 1907. In the middle of August, when scarcely three months pregnant, she began to suffer from vomiting. The vomiting at first occurred only after meals, but after a few weeks it became worse, and during October she vomited frequently during the day quite irrespective of the taking of food. In the beginning of November the vomiting and retching became almost persistent, and frequently she brought up mucus tinged with blood. In the middle of November she was losing flesh so rapidly, that she attended the out-patient department of Leith Hospital. There she received some medicinal treatment, but as this was unsuccessful, she was recommended to come to the Maternity Hospital, being then six months pregnant.

On admission she was noted to be anæmic and emaciated. Her face and lips were pallid, and her sclerotics somewhat jaundiced. There was no dropsy or cyanosis. Her temperature was 96·6 and her pulse 152 per minute. Examination of the abdomen revealed nothing abnormal. The stomach was not dilated at all. The uterus reached to a point about 1 inch above the umbilicus. Its surface was smooth, and its consistence soft. The respiratory and circulatory systems were practically normal, except that the pulse was very frequent,—152—thin, and rather irregular. Vaginal examination revealed slight patency of the os externum. There was no erosion or injury of the cervix, nor any abnormality observed. Four ounces of urine were drawn off by catheter. It was acid in reaction, of specific gravity 1025. It contained small quantities of albumen, blood, and bile. Urates, and granular and blood casts were found in the deposit. There was no trace of either *leucin* or *tyrosin.*

The details of the treatment are not important. After careful consideration it was thought desirable to stimulate her with a view to the procuring of abortion, which was the only form of interference possible. On admission at 6.30 P.M. she was at once put to bed, and stimulated, with hot bottles and a rectal injection of saline solution. This raised the temperature to 97, and reduced the pulse to 120. After a large dose of bismuth and salol, she was given diluted milk and soda water, but she at once vomited it. Thereafter she was fed *per rectum.* She vomited at frequent intervals, the vomit being like coffee-grounds and containing blood and bile. Next morning her temperature was normal, pulse 120. The bowel was washed out, and some very offensive material removed. She was given nutrient enemata, and stimulated by strychnine and strophanthin during the day; at night her pulse became very irregular. In spite of treatment, it went up to 160, and her respirations to 52 per minute, and she complained of præcordial pain. At 3 A.M. the pulse suddenly dropped to 94, and there was marked dyspnœa, and at 3.40 she died. Death occurred in less than thirty-six hours after admission. During all this time she was *in extremis,* her condition precluding the possibility of interference.

An autopsy was granted, of which the following is a brief report.

### *Report of the Examination of the Body, æt.* 33 *years, conducted* 25*th November* 1907.

The body is that of a well-developed but lightly built woman, and shows a considerable degree of emaciation.

On opening the abdomen the pregnant uterus was seen, the fundus being at the level of the umbilicus. There was no evidence of any peritonitis or anything pathological in the exposed viscera.

The uterus and appendages were removed, and nothing abnormal was to be seen from external examination, with the exception of a small subperitoneal fibroid on the right lateral aspect of the uterus.

The kidneys, spleen, and liver were removed and examined. The right kidney showed extensive fatty change, and the left kidney the same condition to some extent. The liver was fatty. The spleen was normal.

The thorax was explored through the diaphragm, the thoracic viscera being severally removed. The heart was perfectly healthy and normal in all respects, with the exception of a few petechial hæmorrhages in the endocardium. There was no evidence of dilatation; the valves were free from disease, and there was no sign of atheroma of the aorta or of the coronary arteries.

The lungs were normal, with the exception of an old pleuritic patch, the size of a penny, at the base of the left lung.

Lastly, the stomach and œsophagus were removed and carefully examined. The stomach was small and contracted, and was found to be perfectly healthy in all respects. The walls of the venous plexus at the lower end of the œsophagus, however, were extremely thin, and several branches had been ruptured, presumably by the violence of the persistent retching. There was slight superficial ulceration about the seat of rupture. This would adequately account for the history of hæmatemesis during the few days before death.

The cause of death was apparently exhaustion consequent upon the persistent hyperemesis. No trace of food was to be found in any part of the alimentary tract.

The uterus and appendages were transferred to formalin for subsequent examination.

With the exception of the small subperitoneal fibroid already referred to, an external examination of the organ and its appendages showed nothing to note. A portion of the anterior wall being incised as a flap, and turned to the right, there was revealed the existence of a placenta prævia—a condition not previously suspected.

As to the pathology of the case just related, I must defer this till later. Meantime it is well to classify the various forms of hyperemesis in a definite way. It may be safely said, that it is only within the last ten or fifteen years that any approach to a definite classification has been attempted out of the chaos of conflicting views. To Williams's classic paper we are indebted for placing the matter in a clear and definite light, and I think we shall all be disposed to agree that firstly there are a large number of cases which are *reflex* in their nature.

In this paper I do *not* refer to the ordinary vomiting of pregnancy. I say advisedly, *of* pregnancy as distinguished from vomiting *in* pregnancy, which may be due to any number of causes independent of the pregnant condition altogether: I am discussing that form where the condition has ceased to be only a symptom and become a grave disorder.

I think that no question will be raised with regard to the first group, namely, *reflex* vomiting. Under this head may be classified all those cases which are due to mere abnormalities of the generative organs, and, first and foremost, I may mention displacement of the uterus, especially backward. I do not stay to discuss this matter, because such cases are familiar to all, though at the same time, in some recent papers, particularly that of Williams, the influence of displacements backwards has been very much minimised. It is perfectly true that in many cases of retroverted gravid uterus hyperemesis is not a feature; but there is no shirking the fact that where vomiting is present the replacement of the organ in many cases brings about a cessation of the symptoms. So far as our knowledge at present goes, such cases of hyperemesis must be put in the category of reflex.[1]

Again, the presence of an ovarian tumour, I have observed, is sometimes a cause of hyperemesis. I have seen such a case; in this patient the ovarian tumour was quite a considerable size, reaching up to the umbilicus on the left side. The pregnancy was advanced, close upon four months, and could be quite well diagnosed in association with the tumour, all the more so as the pedicle of the tumour was long. When the patient came under my charge she had been persistently sick for a month, and was in a very reduced and emaciated condition. On removal of the tumour the sickness ceased almost immediately.

Again, hydramnios, occurring with twins in the early months of pregnancy, has twice come under my observation as a cause of hyperemesis. In both cases the women spontaneously aborted at the third month, the uterus being stretched up to the umbilicus, and with the evacuation of the uterus the vomiting ceased.

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[1] See case of Asthma Gravidarum.

Hydatidiform degeneration of the chorion is obviously a likely cause of it, although personally I have not seen this form of chorionic degeneration give rise to dangerous hyperemesis. Whether these conditions to which I have just referred act by producing over-distension of the uterus, as in a case of simple hydramnios, or as in a case of hydramnios with twins, or with twins alone, by some alteration in the metabolism—that is, that the maternal organism is unable to cope with the increased amount of fœtal products—or by the absorption of toxines, is a matter which at present seems to be wrapped in mystery; and the mere fact, that the sudden termination of pregnancy in such cases has been followed by cessation of the sickness, throws very little light upon the problem. But whether it clears up our pathology or not, the fact remains that in such cases removal of the tumour, or the evacuation of the uterus, evidently has the desired effect.

Rosenthal and others have found this condition associated with extreme rigidity of the cervix, while Veit and others have found it associated with inflammatory conditions of the endometrium. I believe that most authorities will be disposed to think that the conditions of the cervix and of the endometrium are coincident, and are not likely to be the original cause of the vomiting. Possibly they may aggravate the condition.

As to the second variety, namely, cases of *neurotic* or hysterical vomiting of a serious nature accompanying pregnancy, we are mainly indebted to Kaltenbach for segregating this group of cases. Such cases are to be diagnosed by the fact that there is no appreciable change in the genital organs, by the fact that the patient is probably of a neurotic or hysterical temperament, by the fact that there are no abnormal conditions to be found in the urine, and no change in the liver. Such cases almost invariably get well, and as a rule are not associated with much anxiety, although I must here put on record one case, which was under the care of Dr Underhill and myself. It was that of a highly neurotic woman in whom we could find no trace of any abnormality whatever, and yet whose vomiting was persistent. It began after the first cessation of the menses, and persisted until the fourth month. Realising the neurotic nature of the case and the capriciousness of the disease, we waited on patiently from day to day, in the hope that the symptoms would cease or at least become ameliorated. Unfortunately they continued with increased severity, until the patient was reduced to extreme emaciation, with a small, flickering pulse. Much against our will, we determined to evacuate the uterus, and did so, and the symptoms ceased the next day, the patient going on rapidly to health.

Assuming, however, that these cases are hysterical in their origin, or at any rate due to increased nervous irritability, or diminished reflex control in which slight stimuli, which would have no effect on a healthy woman, produce this excessive vomiting, these are the cases that lend themselves to medicinal treatment, especially to suggestion and rest-cure; and in several such cases I have found Rosenthal's suggestion of isolation and moral and intellectual treatment of the utmost value.

I must here again point out that I do not refer to the ordinary vomiting of pregnancy, which can be treated *any* way, or *no* way, just as it happens, but I am dealing with *hyper*emesis, properly so called.

With regard to the third variety—*toxæmic* vomiting—of recent years much more attention has been paid to this variety than to either of the others, and, as in dealing with eclampsia, so with the condition under discussion, the reputed sources of these toxins are legion. In fact, some writers, such as Ewing, look upon hyperemesis and eclampsia as different manifestations of the one toxin of pregnancy. No one has done more to elucidate this question than Williams.

Briefly, there are four main sources which are supposed to give rise to the poison or poisons:—

1. *The alimentary tract.*
2. *The products of conception.*
3. *The ovarian secretion.*
4. *The liver.*

1. The blame which is laid on the alimentary tract rests in part on the presence, in many cases of hyperemesis, of indol, skatol, and aromatic sulphates, of acetone, diacetic acid, urobilin, etc., in the urine. It is supposed that these toxins circulating in the blood produce the neurosis which is manifested by the vomiting. Clinically this view is supported by the success which in many cases follows the free washing out of the bowels.

2. The view that the poison is a cytotoxin derived from the syncytium of the chorion is held by Veit and one or two others. "It appears that the syncytial cells produce a hemolytic and the blood-serum a syncytiolytic agent. The former sets free albuminous substances in the blood designed probably for the nutrition of the fetus; the latter keeps in restraint the exuberant growth of syncytium, and by the solution of the cells probably frees substances which influence both the maternal and fetal organism. If the balance between hemolysis and syncytiolysis is disturbed, it is probable that the maternal organism is adversely affected and that the toxemia of early pregnancy is a result." Such is Veit's theory, but his arguments are not conclusive, and further proof is required before we can accept it fully.

3. That hyperemesis is due to some abnormality of, or interference with the ovarian secretion is still merely a pious opinion held by one or two authorities. Turenne in 1905 published a number of cases which showed marked benefit from the exhibition of ovarian substance by the mouth.

4. The bulk of the evidence tends to throw the guilt upon the liver as the source of the poisons.

The main facts upon which this theory rests are, firstly, twelve cases reported by reliable observers, in which, post mortem, the liver showed necrotic changes similar to those found in acute yellow atrophy. Further, there are at least half a dozen other cases reported, in which marked fatty degeneration of the liver and kidneys was noted. Again, there is a close similarity in the clinical appearances of hyperemesis and acute yellow atrophy, although the one usually appears in the first and the other in the second half of pregnancy. Lastly, it is well known that in pregnancy a considerable strain is put on the functions of the liver. It is liable, therefore, to become a weak spot; and of late years many cases of pernicious vomiting in pregnancy, in which minute and careful chemical observations have been made, point directly to the metabolism of the liver as being at fault.

The most interesting of these observations is that while the urea, as tested roughly by the hypobromite of soda test, appears to be normal in quantity, it is really diminished when more accurately estimated; whereas the ammonia coefficient is increased. That is to say, that while the total nitrogen output is unaltered, the urea is diminished and the ammonia increased. This may either indicate that the liver is unable to carry the oxidation of nitrogenous substances beyond the stage of carbamate of ammonia, which is the precursor of urea, or that an excess of ammonia is formed in the effort to neutralise an acid intoxication, which would be incompatible with life. Cases of acid intoxication, such as occur with delayed chloroform poisoning, undoubtedly show similar metabolic changes as well as similar post mortem appearances.

To which of these varieties—reflex, neurotic, or toxæmic—we are to refer the case before us it is not just easy to say.

The neurotic theory can in this case be excluded at once. But two elements seem to me to be apparent in this case. First of all, there is the presence of the fibroid tumour in the lower zone of the uterus, over which the placenta distinctly bulges. It may be noted in passing, that this association of the fibroid and the placental site did not cause hæmorrhage, either external or post-placental.

But placed as the fibroid was in that part, which in this particular instance was the most vascular and vitalised part of the uterus, it was just in the position where it was most likely to light up reflex symptoms.

In the second place, there is the presence of a placenta prævia in the primigravid woman, which in itself is an extreme rarity, and due in this case, no doubt, to the presence of the fibroid altering the contour of the uterine wall. In either case the primigravid condition is calculated to render the maternal organisation more susceptible to reflex influences and irritations.

The toxæmic theory receives the most support from the ordinary sources of evidence at our disposal. This evidence is unfortunately far from complete; but the patient lived such a short time after admission, that there was little time to make observations. The condition of liver, kidneys, and urine however pointed to the case being of the toxæmic variety.

In this case the cause of death was probably exhaustion following on starvation. There was not a particle of food found in the whole alimentary canal. Inanition is indeed the usual cause of death, as far as can be gathered from the literature.

With regard to treatment, I make no reference whatever to medicinal treatment, but am concerned only with those cases in which the induction of abortion becomes essential; and it must be apparent that in the first two varieties—reflex and neurotic—there must seldom be any necessity to have any recourse to this step. There are, of course, exceptions, as in the case to which I have just referred.

On two occasions I have been asked to induce abortion, where the cases were obviously of the neurotic character, and after deciding upon the step and going the following morning to perform the operation, in both instances I was informed that the patient had ceased to vomit for twelve hours. In both those cases interference would have got the credit, where, as a matter of fact, the mere mental effect was enough to stop the vomiting.

It seems to me that when indications of either liver or kidney disturbances have shown themselves, after careful examination of the urine and condition of the liver, the possibility of having recourse to abortion must be kept in view; and under these circumstances the operation should be performed long ere the patient reaches the condition which I have described to-night. Procuring abortion by the rapid method is, under these circumstances, the proper one to adopt, and if undertaken at a reasonable time, before the patient has become exhausted, it is comparatively safe. The point is, that once the toxic variety is recognised, along with the recognition of the toxæmia there ought to be recognised likewise the possibility of the induction of abortion having to be resorted to in the near future.

In the reflex variety one will endeavour to rectify any malposition of the uterus, to remove any ovarian tumour, and, it may be, to cure any cervical erosion. In cases of suspected twins and hydramnios, abortion may require to be induced, and in hydatidiform degeneration of the chorion pregnancy must be at once interrupted.

In the neurotic variety, firm moral suasion, combined with a more or less strict seclusion and rest-cure, may be expected to do much good, and in theory the induction of abortion in this class of case should be unnecessary.

Generally speaking, in the toxæmic variety pregnancy should be terminated. The difficulty is rather to know the psychological moment at which to do so, and that would be determined mainly by a careful examination of the pulse and temperature. If there is a distinct rise of temperature and pulse, along with the alterations in the urine to which I have already referred, then I think there can be no doubt that the induction of abortion is definitely indicated. Of course, every case must be judged on its own merits, but generally speaking, the coincidence of those three conditions will, in the majority of cases, decide the point.

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*The President*, having cordially thanked Sir Halliday Croom for his most interesting paper, invited discussion on this important subject.

*Dr S. Sloan* (Glasgow) thought the subject a most important one. Doctors must, of course, wait a reasonable time before proceeding to empty the uterus in these cases, but the difficulty lay in defining exactly what constituted a reasonable time. A doctor was apt to wait, hoping against hope that the symptoms would abate, and to continue treatment by medicine, replacement of the uterus, and so on. He himself had had a case in the spring of 1906, where the patient had suffered from endometritis the previous spring, with fixation. The hyperemesis had been severe but not dangerous, and all medicinal measures were without avail. Physiological enlargement of the uterus below and pressure above caused great sickness. There seemed nothing to do but wait, and the patient was delivered at full time of a healthy child, and the adhesions disappeared. What was Cause? What was Consequence? What was Coincidence? It was very difficult to determine. In fatal cases the doctor generally wished he had done something different.

*Dr Haultain* said there had been no previous discussion of this very important subject before the Society. There were two main causes: (1) nervous, and (2) toxic. (1) was generally due to distension of the uterus. The proof was clear. Distension of the uterus is the cause of the ordinary morning sickness. And in cases where there is a special degree of enlargement of the uterus, there is present vomiting to an unusual amount. Such cases were twins and hydramnios. He had seen two cases of myxoma of the chorion where distension was undoubtedly the cause of hyperemesis. There were also cases where it was due to displacement. Such were particularly cases of vomiting in the early months of pregnancy. (2) Toxic causes occurred more frequently in the later months of pregnancy, the vomiting being associated with albuminuria. It seemed, therefore, that one should look for toxic causes in the later months and for distension and reflex causes earlier. A neurotic woman was, naturally, more likely to have sickness. He looked upon the vomiting in the case under discussion as due to difficulty in distension of the uterus rather than to toxic conditions. The lower uterine segment ought to distend quickly in the early months. The presence of the placenta might have prevented this, and in this case, the fibroid tumour would also interfere with the dilatability of the uterus. The important question is, What is the psychological moment for emptying the uterus? How long should the doctor wait? This is the crux of the question from a practical point of view. From his own experience, his rule was to empty the uterus when the temperature begins to rise. There were three definite stages: 1. Vomiting; 2. Vomiting, with rising temperature, especially in the evening; 3. Temperature falls, when any treatment is hopeless. The second is a grave condition, and it is then that the uterus should be emptied.

*Dr Ranken Lyle* had only one point to emphasise. He had come to the conclusion that the more severe the hyperemesis the less grave the case, and *vice versa*. He explained this paradox by pointing out that, in the cases where the patient is very severely ill and getting worse, the doctor acts at once, while in those where the vomiting is severe, he is apt to wait, and waiting is dangerous. He had a case in which the uterus had been emptied twenty-three times. He might almost term it a case of "malignant hyperemesis." When two months pregnant the woman began to vomit, and continued until practically moribund, refusing all food. The matter vomited was gelatinous, and "set" as it cooled. He had advised removal of the uterus, but the patient refused. These cases were neurotic, and he advocated threats of abortion as the most effective method of cure. Many patients could stop vomiting at will. He had no confidence in drugs as effective treatment. Cases of nervous patients were not to be disregarded, as the malady is insidious, and if the patients are allowed to go on vomiting they may end by dying of it.

*Dr Haig Ferguson* had not much to add. There had been no mention of vomiting due to causes outside pregnancy altogether, such as gastric conditions. He had known of a case where the uterus had been emptied and the cause of illness was afterwards found to be a strangulated hernia. Patients should be carefully examined. Reflex vomiting had been regarded as due to uterine conditions, distension, malposition, etc., but many women had displacement, distension from hydramnios, etc., without vomiting, and he would classify all such cases as hysterical, the displacement, etc., being merely accidental. These cases might lead to death unless treated early. Toxic conditions cause vomiting in later pregnancy. To his mind, also, the important point is when to interfere. In this he was inclined to differ from Dr Haultain. The pulse was, in his opinion, really more important than the temperature as a guide. He would disregard the temperature to some extent, and be guided by the pulse rate, eliminating a neurotic pulse. When the pulse became feeble and intermittent, it was time to interfere at once. He would put the mortality probably at 50 or 60 per cent.

*Dr James Ritchie* said that, in neurotic cases, where the vomiting had been persistent, he had found that nux vomica or strychnine had given better results than any other medicines.

He would question Sir Halliday Croom's reasons for dismissing neurotic origin in the case under discussion simply because of the patient's nationality. Turning to toxic causes, he could not agree that the evidence pointed to the liver as the seat of trouble, because, if it were, recurrence in the same individual would be far more common than it is. His experience did not coincide with Dr Haultain's as to hydramnios being associated with vomiting. He had had many cases of hydramnios, and had not observed vomiting as a prominent symptom. He agreed with Dr Haig Ferguson that the pulse was a more accurate guide than the temperature, for interference.

*Dr W. Fordyce* said he had seen the patient mentioned in the paper. At that time she was attending Leith Hospital as an out-patient and was unaware of pregnancy. He had no reason at that time to think that the case was grave. The causes of hyperemesis, as had been said, were divided into two classes: *reflex* and *toxic*—reflex including neurotic and hysterical cases. He had had a very bad case with hydatid mole, but, since then, had seen cases very similar where there was no vomiting. No doubt distension of the uterus was a contributory cause: in fact, packing of the uterus induced vomiting sometimes, which ceased when the plug was removed. Toxic vomiting generally occurred later in pregnancy. He had had a case where the liver was undoubtedly at fault. The patient began vomiting after journeying here from Ireland, being seven months pregnant, and the condition became so grave that it was decided to induce artificial labour. The patient, however, went into labour before this procedure was carried out. Here there were clear symptoms of jaundice, the urine was scanty and contained tyrosin and leucin crystals; but there was no albumen. Morphia, in small doses, had proved very useful; also the administration of diuretics, and washing out of the rectum. A point which had not been discussed was the method of emptying the uterus. Sir Halliday Croom had recommended rapid dilation of the uterus and emptying at one sitting. He had had two cases where this method had been employed, and in each case the patient had died from the shock of the operation. In one case Bossi's dilator had been used, and in the other the hand. He thought the better method was to separate the membranes or to produce a slight dilation, and then get the uterus to discharge by natural means. He believed the sudden shock of emptying the uterus to be bad for the patient.

*Sir Halliday Croom,* in reply, thanked the Society for the manner in which his paper had been received. With regard to the indications for interference, he agreed both with Dr Haultain and Dr Haig Ferguson as to the importance of temperature and pulse, but he believed that examination of the urine was more important still. Should the symptoms point to disorder of the liver, he would be disinclined to empty the uterus. He congratulated Dr Lyle on his extraordinary case, which he might term the apotheosis of hyperemesis. He had never seen such a case. With regard to the methods of emptying the uterus, he did not agree with Dr Fordyce. The ordinary methods he advocated took too long, and in rapid dilation there was less chance of hæmorrhage. He considered that the rapid method gave the patient the better chance.

## MEETING IV.—FEBRUARY 12, 1908.

Professor STEPHENSON, *President, in the Chair.*

I. Mr Albert E. Bennee, M.B., Ch.B., The Residency, Royal Infirmary, was elected an Ordinary Fellow of the Society.

II. This meeting was almost entirely devoted to a discussion, in Private Business, of the provisions of the Notification of Births Act, 1907, on a motion by *Dr Michael Dewar.*

III. A PLACENTA from a case of TRIPLETS, was shown by *Dr Wm. Henry Miller,* who gave the following note of the case:—

The specimen itself is only of interest in that it allows me to read a short clinical note on the case from which the specimen came—a case of triplets, born near the full term, in which the children survived. Mrs S., aged 36 years, iv.-para, last child born five years ago, expected her confinement on the 6th of February. She came from the country to be confined, and I had no opportunity of seeing her until the beginning of January, when I found her suffering from general anasarca and great enlargement of the abdomen, the ordinary pressure symptoms being present in an aggravated degree. Two fœtal hearts were heard; I did not listen for a third. The urine, though abundant, contained a considerable amount of albumen, and there was a diminution in the percentage of urea. Labour came on on 23rd January. The first child presented by the breech, the other two by the head, with the occiput to the front. Three hours elapsed between the birth of the first and second, and ten minutes between the second and third. The placentæ were expressed, owing to slight hæmorrhage. The infants weighed 4 lb., 6 lb. and 4 lb., respectively. The placentæ of the first two children are firmly attached by their adjacent edges so as to form one mass. Each fœtus had a complete set of membranes, each developing from a separate ovum. The patient made a good recovery, and the infants, all girls, still survive.

## IV. BIRTH-STOOLS IN EGYPT.

By Emeritus Professor Sir Alexander Russell Simpson,
M.D., D.Sc., LL.D.

In December 1894 I showed to the Society a delivery-pan in use at the present time in Spain, and took occasion to point out the different positions in which women are or have been placed during labour at different times, in different regions, and among different races—lying, half-lying or leaning backwards, sitting, squatting, kneeling, standing, hanging, swinging—to which has to be added the leg-hanging position advocated by Walcher. A practitioner may come upon a parturient patient in an unexpected position. Thus Dr A. A. Matheson, when acting as assistant in Pembrokeshire many years ago, wrote me:—"When called to a labour case the other morning I ascertained from the nurse, on my arrival, that the child was 'just about entering the world.' But on entering the patient's room I was rather astonished to find her kneeling on the floor, with her elbows on a chair placed in front of her. I made some remark about her not being in bed, when I was told that she was accustomed to have her labours in that position; and she had had ten before the present one. The labour, which was quite normal, was completed in less than an hour after my arrival, when the patient was assisted into bed. I believe it is the custom for the wives of farmers and the labouring classes in this neighbourhood to be delivered in the position I have indicated. I felt rather awkward in making my first vaginal examination, but after this I made all examinations quite easily, sitting on a low stool behind the patient."

Some years ago I sent to Mr Stephen Paget a copy of an introductory lecture in which I had made quotations from the very valuable and interesting *Memoirs and Letters of Sir James Paget.* Among others, I had taken note of the fact that in crossing from Dover to Boulogne on his first visit to the Continent Sir James had told of his "being obliged," as he expressed it in a letter to his fiancée, "to sully my chirurgical purity by ushering into the world a young sea-nymph." In acknowledging the pamphlet, Mr Paget was good enough to tell me the story of the adventure. "The patient was a poor woman, the wife of a clown in a circus; she was going to meet her husband at Boulogne. The captain came into the little cabin, where my father and a few passengers were sitting, and asked if there was a medical man among them. My father warily kept silence. Then the captain came back and made a second appeal, and then my father disclosed his qualification, and learned, for the first time, what was in store for him! *He had never seen a confinement.* 'I had not been present at one,' he said, 'since I was born.' It was easier then than now to become qualified. But he went. He couldn't speak a word of French, nor she of English, and she insisted on being delivered in some odd posture, I forget what, anyhow it was different from that described in our lectures and books! So my father wisely did nothing beyond saying from time to time, '*Courage, madame! Courage, madame!*' But everybody believed that he had rendered signal service to the poor lady."

In my communication to the Society in 1894 I referred to Kilian's list of thirty-one different authors whose names are associated with birth-chairs of various forms, but imagined that all such chairs and stools had for ever fallen out of use, and were only objects of antiquarian interest. Dr Lasbrey of the Church Missionary Society, however, some time ago sent me a paper, in

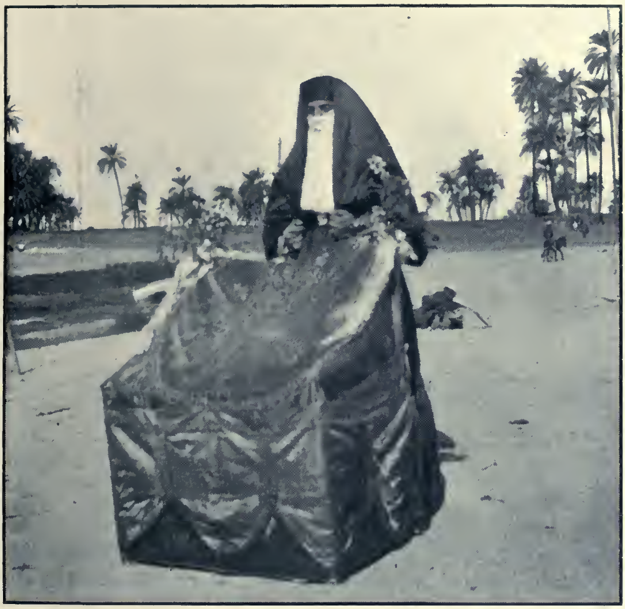

Fig. 1.—Aswan Midwife with her Birth-stool draped and ready for transport to a Patient's House.

which he showed that they were still in use in Cairo among the native population. Spending the winter of 1905-6 in Egypt, I found that birth-chairs and stools are in common use all along the Nile. It was at Halfa that I first saw one, through the kindness of Dr Attiyah, assistant-surgeon in the Soudan Army Medical Corps, who was in charge of the Halfa Hospital and district. His hospital nurse goes out to attend some of the village women in their confinements, and takes with her for their accommodation a birth-stool, which he showed me. It is a kind of low chair of slight construction, the seat being 9¾ ins. from the ground, with a light railing forming the back and sides rising to a height of 11¾ ins. above the seat. The chair width from side to side is 2 ft. 7¾ ins., the depth from front to back is 1 ft. 7 ins. There is a crescent hollowed out of the front of the seat, 9½ ins. in width, 8½ ins. in depth. It is fitted with a crescentic cushion, and the patient sits on it during labour, with the thighs separated and the legs extended, while the nurse sits on a cushion on the floor in front of her to give her the needed help and—as old Raynalde has it in his *Birthe of Mankynde*—"to receive that which is looked for."

Not all the midwives are equipped with birth-stools. Stopping at Korosko, we ferreted out the wise woman of the village. She told us she had been there twenty-two years, and had about forty confinements a year. She had a kindly, humorous expression on her old black face, and one could easily fancy her chaffing and cheering her patients during their labour. She said it was always an easy process, and she had never had a death all these years except of one or two babies. As men may not enter an Arab woman's house, she had come out to her door for the interview, and when we asked about the position of the labouring woman, she seated herself on her doorstep, and stretching out her legs, made a child that was standing by sit down on her ankles, and explained that when a baby was being born the mother was made to sit in that fashion on the nurse's legs, or on the legs of a neighbour, whilst the nurse gave her other attention. At Dakkeh, where also the *sage-femme* has no stool, she told us that she usually makes her patient sit down on a couple of stones or bricks placed a little apart from each other. Professor Maspero showed me that in hieroglyphic tables the figure of a kneeling woman, with the head and arms of a child projecting beneath, is sometimes represented as placed upon two square blocks.

At Aswan, with its larger population and some proportion of well-to-do residents, the community midwife whom I met is a person of more importance, and usually goes to her cases accompanied by a Nubian attendant. She was trained in the Kasr-el-Ainy Hospital at Cairo, and speaks some English. Her birth-chair is of a more complete construction than that of the Halfa woman, and resembles the one I show to the Society, which was procured for me from a Cairo midwife by Dr Lasbrey. The seat is capable of being lifted up in two halves, and the sides can be folded together for facility of transport. The photographs I have here were taken on the shore of the Elephantine Island, off which our dahabiyeh was moored, opposite Aswan. In No. 1 the midwife is seen in her best attire, wearing a satin gown, in which she makes a visit to her patient seven days before the expected term of labour. On this occasion the birth-stool is conveyed to the house covered with silk-embroidered drapery, and having a bouquet of roses at the high corners. We had not roses; but one of the sailors pulled a couple of bunches of lupins from a plot near by to give something to the effect. When the call comes for service she puts on clean linen clothes. Fig. 2 shows her in her working-dress seated on one of our boat's chairs beside her birth-stool. The cushion, that is found on all the stools, at once struck one as a possible source of danger from infection. But we were told that the cushion after use is always exposed to the sun, and that the strong rays of the Egyptian sun produce effective

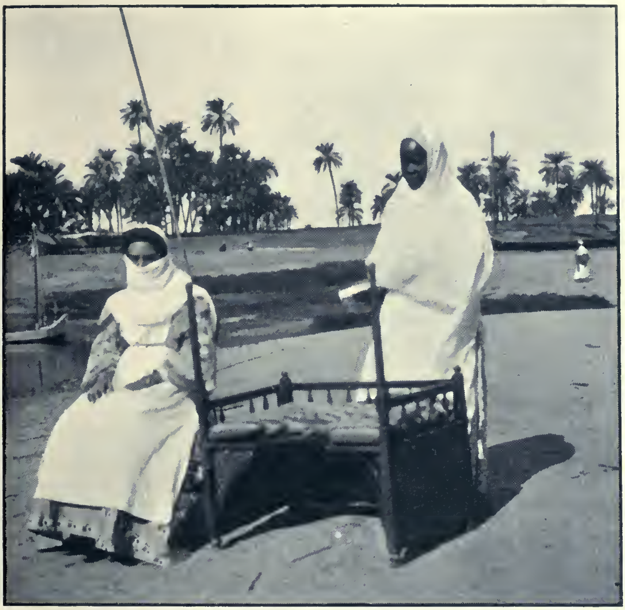

Fig. 2.—The Midwife seated beside her Birth-stool, behind which stands her Nubian Assistant.

sterilisation. It was added that the sun-burnt sand of the desert is not only aseptic, but even actively antiseptic. The patient sits on the stool with her legs extended on a couple of smaller stools on either side of the midwife, who sits on a cushion in front of her to give the needed help. The uprights are for the patient's hands to lay hold of when she is straining. A woman standing behind her supports her when she is disposed to lean backwards. The midwife said that the women in their agony when they bend forward very commonly lay hold of her hood or her hair, or even her scalp, with their teeth, and groan. When the business is over, the stool is folded as seen in Fig. 3. The two lifted-up halves of the seat look very pale, for they are not varnished like the rest of the article. The uprights of the folded-back sides rather hide the excavation of the seat. On the boat's chair lies the doubled-up cushion. The nurse is in her working-dress, with her Nubian maid beside her. She leaves her birth-stool in the patient's house for another week, and she and the patient's friends have a kind of small feast of sweatmeats before, on the seventh day, she has it carried away.

When historians of obstetrics try to trace the beginnings of their art, they find the earliest reference to it in a story the scene of which is laid on the banks of the river Nile. It is an old-world record of the birth-throes attendant on the emergence of an infant people into national life. The Hebrew annalist is telling how his ancestors were oppressed by a Pharaoh who made the lives of the Children of Israel bitter with hard service. But the more the Pharaoh afflicted and tried to suppress them, the more they multiplied and the more they spread abroad. "And," as one who escaped in that killing time told the story (Exodus i. 15-22, R.V.), "the king of Egypt spake to the Hebrew midwives, of which the name of the one was Shiphrah and the other Puah: and he said, 'When ye do the office of a midwife to the Hebrew women, and see them upon the birth-stool, if it be a son, then ye shall kill him; but if it be a daughter, then she shall live.' But the midwives feared God, and did not as the king of Egypt commanded them, but saved the men-children alive. And the king of Egypt called for the midwives, and said unto them, 'Why have ye done this thing, and saved the men-children alive?' And the midwives said unto Pharaoh, 'Because the Hebrew women are not as the Egyptian women; for they are lively and delivered ere the midwife come unto them.' And God dealt well with the midwives, and the people multiplied and waxed very mighty. And it came to pass because the midwives feared God, that He made them houses." The narrative goes on to tell that when these high-minded women refused to degrade their profession by becoming infanticides at the call of the tyrant, Pharaoh had to turn to others to carry out his deadly will. So "he charged all his people saying, 'Every son that is born ye shall cast into the river, and every daughter ye shall save alive.'" And the devouring crocodile among the reeds of the Nile, the Rahab dragon, became the horror of the Hebrew imagination through all the history of the race, down to the Revelation of St John the Divine.

Nearly a quarter of a century ago I saw, along with Professor Virchow in the Boulak Museum, the mummy which had not long before been discovered of this "Pharaoh of the oppression." As I have looked on it later and on the mummy of his successor, who proudly said to Moses, "Who is Jehovah, that I should harken to His voice?" I have thought how much grander than Rameses and Menephtah were the two women whose bodies were not mummified, but whose spirits have been glorified, and whose names have come to be placed first on the roll of the world's obstetricians because they refused to take the lives of new-born children at a king's command.

The age-long continuity of customs in the unchanging East has often been commented on. It makes it easy for us to

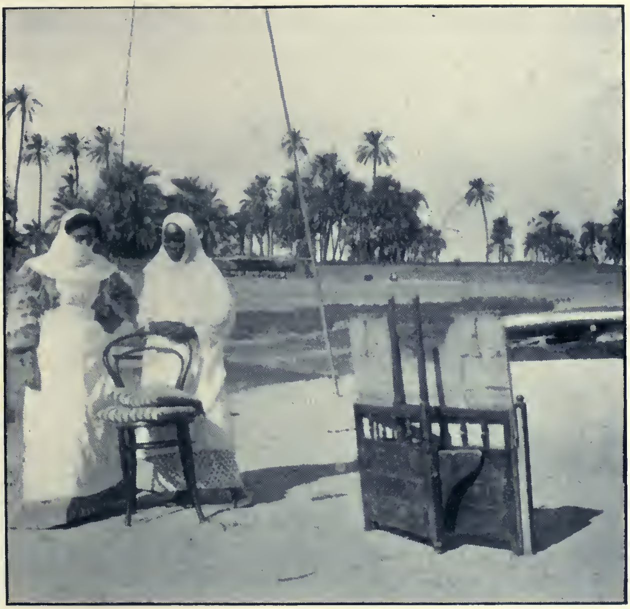

Fig. 3.—The Birth-stool in collapsed condition is to the right. Midwife and Attendant stand behind an ordinary chair.

believe that Shiphrah and Puah possessed, and carried with them to their cases, just such birth-stools as those on which the Egyptian midwives of to-day place their patients when children are being born in cities lying along the banks of their ancient river.

*The President* thanked Sir A. R. Simpson for his interesting notes.

*Dr Keppie Paterson* said he had listened with interest to Sir A. R. Simpson's description of Egyptian birth-chairs. He had been told by a woman doctor that in Morocco the women were often confined sitting on the thighs of two neighbours who squatted down close to each other. A rope was hung down from the apex of the tent, and the patient grasped this during the bearing-down pains. His informant remarked that she had never come across a case of a torn perineum after such a delivery.

## MEETING V.—MARCH 11, 1908.

Professor STEPHENSON, *President, in the Chair.*

I. The following gentlemen were elected Ordinary Fellows of the Society:—Norman S. Carmichael, M.B., Ch.B., 22 Northumberland Street, Edinburgh; J. A. Manifold, M.B., Ch.B., Royal Maternity Hospital, Edinburgh; H. P. Milligan, M.D., Royal Maternity Hospital, Edinburgh.

II. *Sir J. Halliday Croom* showed—(*a*) A FIBROID TUMOUR OF THE OVARY where the patient had been tapped fifteen times.

(*b*) A FIBROID TUMOUR OF THE UTERUS, removed by hysterectomy from a girl of nineteen. The patient had been troubled with constant bleeding, and the case looked like one of pernicious anæmia.

(*c*) A FŒTUS WITH HYDROCEPHALUS, delivered head last by catheterisation of the spinal canal. This method had to be adopted to draw the fluid from the head, which it was impossible to reach.

## III. ON THE TRANSMISSION OF NITROGENOUS COMPOUNDS FROM MOTHER TO FŒTUS.

By Dr JAMES LOCHHEAD.

MR PRESIDENT AND FELLOWS,—At a former meeting of the Society, I had the privilege of laying before you some observations regarding the transmission of carbohydrates from the mother to the fœtus.[1] At that time I stated that the experimental results proved beyond a doubt that in the rabbit the placenta played an active part in the transmission, and did not act as a mere sieve or filter. Further, I showed that at least part of the physiological activity of the placenta probably consisted in an enzyme action by virtue of which the more complex carbohydrate glycogen was hydrolysed into a simpler carbohydrate. The placental enzyme resembles the enzymes of the alimentary tract in that it could be extracted from the cells by glycerin; in other words, it comes into the class of secreted enzymes.

To-night I intended to talk about the transmission of another great group of substances—the nitrogenous compounds—including simple proteids such as those of the blood serum, and compound proteids such as hæmoglobin and nucleoproteids. But I found that the paper would have occupied more than a reasonable time, so I shall discuss only the simple proteids.

My experiments were devised with the object of finding out whether, in the transmission of these nitrogenous substances, the placenta played an active or merely a passive part, and if active, whether the action, in part at least, consisted in an enzyme action resembling that which probably takes place in the placental metabolism of carbohydrates. But before describing these experiments, it may be advisable to draw attention to the views previously held on the subject.

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[1] See Appendix to this Volume, p. 267.

It has long been recognised that the fœtus, which is continually increasing in weight during intra-uterine life, must continually be assimilating nitrogenous compounds, and it is generally admitted that they are transmitted by way of the placenta. Not only so, but it has been proved that the proteids increase out of proportion during the progress of gestation. Thus Fehling (*Arch. f. Gynäk.*, ii.) found that the albumin percentage was 5 per cent. of the fœtal weight at the third month, but had increased to 12 per cent. at term, and Cameron and Soldner (*Arch. f. Biol.*, 1900) found that the daily assimilation of albumin increased continuously from 0·174 of a gramme at the fourth month to 4·79 grammes at full time. These figures relate to the human fœtus. In addition, metabolism experiments on the pregnant animal, show that the daily nitrogen intake exceeds the nitrogen excretion, the difference indicating the amount which the fœtus receives each day (Sillevis, *Dissert. inaug.*, Leyden, 1903).

Easy as it is to prove that nitrogenous compounds pass from mother to fœtus during pregnancy, it is more difficult to say how the transmission is effected, and a satisfactory explanation of the process has proved a stumbling-block to all writers on fœtal nutrition. At the same time all authorities seem to be at one in this: that proteids, by reason of their physical properties, cannot pass across the placenta without undergoing some change. Thus Zuntz (*Pflüger's Arch.*, Bd. xiv.), who was the first to draw attention to the complete want of knowledge on the subject, speaks of the difficulty of conceiving of the passage of albumin as such, for it does not dialyse through an animal membrane. He thinks the difficulty insurmountable, and considers two other possibilities: (1) that the developing fœtus gets its proteid elsewhere than by the placenta, or (2) that the placenta is the channel of passage, but in it the proteid is acted on, and split up into bodies possessing a smaller molecule, and therefore better adapted for dialysis. The former is rejected because the *liquor amnii* is not nutritive, and the second is regarded as the only possible method, the transformed product being probably peptone. These views, although based on no experimental data, have been generally accepted and quoted with almost monotonous regularity in every text-book. Within recent years, however, some attempts have been made to establish it on a firmer basis by chemical research, and the experiments have followed two main lines: (1) Can altered proteids, such as albumoses or peptone, be demonstrated in the placenta? or (2) Is there present in the placenta an enzyme by whose action such a transformation of albumin may be brought about?

Regarding the presence of altered proteids in the placenta, I have come across only two references to experimental work, if we exclude the earlier work of Demant (*Z. physiol. Chem.*, Bd. iv.), whose assertion that peptone is a "constant product" of the fœtus of the guinea-pig, was absolutely disproved by Neumeister (*Z. Biol.*, xxvii.). The first reference is contained in a paper by Matthes (*Centralbl. f. Gynäk.*, 1901), who states that albumoses are present in the freshly obtained human placenta. This has later been confirmed by Hofbauer (*Biol. d. menschl. Plaz.*, Leipzig, 1905), who also states that the maternal and fœtal blood are free from albumoses.

I have been unable to obtain similar results. For the experiments I did not use human placentæ, as they contain a large quantity of maternal blood, and therefore an appreciable amount of fibrin ferment. The method employed for the detection of albumoses does not distinguish between them and fibrin ferment, and the fallacy can be avoided only by investigating placentæ which do not contain a large quantity of maternal blood. Hence I used the placentæ of sheep, obtained from the slaughter-house immediately after the death of the animal. The method employed was to separate and mince the maternal and fœtal cotyledons, and place them in boiling absolute alcohol to destroy any ferment or organisms. They were then filtered, and the residues were placed in fresh absolute alcohol and left in it for three weeks. By this means all proteids are precipitated, but with this difference that any albumoses are still soluble in water, while albumins and globulins are not. At the end of three weeks the alcohol was filtered off, and the residues were dried, ground up in a mortar with silver sand, extracted with water, and filtered The clear filtrate gave no biuret or xantho-proteic reaction, and no precipitate was obtained on adding ammonium sulphate. Hence no albumose or peptone is present in the sheep's placenta half an hour after death.

Is a proteolytic enzyme present in the placenta? Within recent years tissue enzymes have been investigated in nearly every organ of the body, and the placenta early attracted attention in the hope of throwing fresh light on its obscure metabolic functions. Thus, in 1901, Matthes (*Centralbl. f. Gynäk.*) studied the products of autolysis in the placenta, and found they were the same as occurred in tryptic digestion. This led the way to Ascoli's discovery (*Z. physiol. Chem.*, Bd. xxxvi., 1902) of a proteolytic enzyme in placental juice, which was capable of transforming fibrin to albumoses, leucin, and tyrosin, *i.e.*, products with smaller molecules, whose passage through the fœtal tissues of the placenta could be explained by physical laws. In this way it was believed that the old idea of the placenta as a digestive organ for the fœtus, like the intestine for the adult, had received full corroboration.

Since Ascoli's discovery other investigations have followed, and the presence of several enzymes in the placenta has been established. But more is necessary before we can say that the placental function is identical with that of the intestine. The fundamental difference between the enzymes of the alimentary canal and tissue enzymes is that the former are extracellular and the latter intracellular, *i.e.*, the intestinal ferments are poured out into the lumen of the gut and are active there, while the tissue enzymes function only inside the cells that possess them, and are never secreted during life. Hence the first question that demands an answer is: Does the placenta possess any *extracellular* proteolytic enzyme?

With the object of answering this question, I carried out a number of experiments with the placentæ of the sheep, cow, and rabbit. The maternal and fœtal parts were separated as accurately as possible. Each was then minced but not crushed. In this way the disintegration of individual cells and a liberation of their *intracellular* enzymes were avoided. The minced tissues were then extracted with glycerine for three weeks, and the extracts were tested for a peptic, tryptic, and ereptic ferment. I have not time to go into the details of the experiments. It is enough to say that in every case the result was negative. Hence there is no *extracellular* proteolytic enzyme in the maternal or fœtal part of the placenta. It cannot, however, be doubted that a proteolytic enzyme can be extracted by crushing the cells, but in this respect it only resembles the other organs of the body. Nor are we justified in assuming that it acts for the fœtus. All other intracellular proteolytic enzymes are "characterised by no over-production, *i.e.*, they are concerned only with the upkeep of the cells in which they exist." If the enzyme of the placenta actively transforms proteids not only for that organ but also for the fœtal organism in general, then it stands in a class by itself apart from all other intracellular proteolytic enzymes.

From the absence of altered proteids in the placenta and of any ferment analogous to pepsin, trypsin, or erepsin, we may state definitely that the placenta no more resembles the alimentary canal than does the spleen or the kidney. As to the changes effected in the maternal blood proteids by the intracellular ferment, we know absolutely nothing. This only can be said: that if such a ferment is present in the syncytium, it cannot act on the proteid molecules till they have entered the syncytium, and this presupposes the possibility of their absorption before they are altered in any way. Hence the next step in the investigation consisted in trying to find out whether the maternal serum albumin could be taken up by the tissues of the fœtal placenta and passed on unchanged to the fœtus.

This problem cannot be attacked directly for want of a method by which we can decide whether the serum proteids of the mother and fœtus are identical. I adopted an indirect method devised by Ascoli (*Z. physiol. Chem.*, Bd. xxxvi.). It depends on the fact that if an animal receives several injections of an albumin not normally present in its blood, its serum will form a precipitate in the presence of that albumin.

Pregnant rabbits were obtained, and each received a single intra-peritoneal injection of 10 c.c. of egg-albumin. After an interval they were killed, and maternal blood was obtained from the still beating heart, defibrinated and centrifugalised. Then the uterus was incised and the blood of the fœtuses was collected in a sterile basin, and also defibrinated and centrifugalised. When the serum appeared as a clear layer, it was pipetted off and used for testing.

The interval between the injection of albumin and the death of the animal was usually two hours, and at this stage the maternal serum contains unaltered egg-albumin as shown by the fact that it will give a positive precipitin reaction with the serum of a rabbit immunised against egg-albumin. Similarly, if, and only if, egg-albumin has passed into the fœtal serum unchanged, the fœtal serum will give a precipitate when added to the immune serum. Such an immune serum was obtained by injecting a rabbit several times with egg-albumin, and in the experiments a small quantity of it, ½ or 1 c.c., was added to an equal quantity of the maternal serum in a test-tube of fine bore. In a second tube of the same size were placed equal quantities of immune and fœtal sera. The tubes were placed in an incubator for two hours, and then in the ice-chest, and examined at intervals. No attempts were made to measure the amount of precipitate, but by using similar tubes and equal quantities of sera, it was possible to make a comparison between the maternal and fœtal precipitates in each case. The results were:—

(1) By the standard of the precipitin test, unaltered egg-albumin was present in the fœtal serum in each of the six cases.

(2) The precipitate in the fœtal serum was always later in appearing and always less in amount than in the maternal serum.

(3) The allantoic fluid contained egg-albumin on the two occasions on which it was tested, and in each case the precipitate appeared more quickly and was greater in amount than in the fœtal serum.

(4) In the experiments done on the same day and tested with the same immune serum, the precipitate was less distinct in the one in which pregnancy was more advanced.

The results show that the passage of colloid substances as such across the placenta is not, as is commonly supposed, impossible. In this respect it resembles the intestine, which has been shown to absorb colloidal silicic acid, and the kidney, which readily absorbs and excretes albumin after injections of egg-white. But though such a passage of unaltered proteid is possible, it does not necessarily take place under normal conditions. Just as in the kidney it is absurd to say that because egg-albumin passes through, therefore the serum proteids also pass into the urine, so we cannot assume that the placenta, which can transmit egg-albumin unchanged to the fœtus, normally allows of the passage of the maternal serum proteids. In my former paper I pointed out that the generally accepted view that glucose passes from mother to fœtus unchanged is based on a similar fallacy. The experimenters had shown that glucose passed from mother to fœtus if it was in excess in the maternal serum, but they were not justified in assuming that it does so ordinarily.

So we must be careful not to conclude too much from the experiments. No other organ of the body allows the serum proteids to pass through it unchanged. For example, a striking transformation in these proteids occurs in the mammary glands or in the salivary glands. The only case of serum proteid passing unchanged is into the lymph, and here it is only a passage through the cells of a capillary wall.

Some further experiments which I carried out go far to prove that serum proteids are not transmitted unchanged to the fœtus. Instead of egg-albumin, I injected ox-serum into pregnant rabbits, and I failed to obtain a precipitate in the fœtal serum on the addition of immune serum, even when the amount injected greatly exceeded the amount of egg-albumin necessary to give a precipitate. Here, again, the placenta is in line with the kidney, and I think it is justifiable to conclude that the difference lies in this: that egg-albumin differs too widely in chemical constitution from the human serum proteids to be made use of by the placenta, while ox-serum proteids, which are much nearer in composition, can be metabolised.

Such are the results as given by my experiments, and they are entirely negative results. They show that the simpler nitrogenous compounds do not pass the placenta as through a sieve, nor are they transformed into albumoses or peptone as in the intestine. The rest must be hypothesis. It seems possible, however, to give a workable hypothesis without assigning exceptional properties to the placenta. If we assume, as we do for every other organ of the body, that its cells are nourished by the maternal blood, then we know how one part of the fœtus, namely the fœtal placenta, is nourished. What changes the serum proteid undergoes in its assimilation by the cells of any organ is quite unknown, and at present it is idle to speculate regarding them in the placenta. The fœtal placenta would then have to provide for the nutrition of the fœtus by elaborating and transmitting such substances as are necessary for the growth of the fœtal tissues. It is even possible that the fœtal placenta itself may manufacture the fœtal serum.

This view, instead of likening the placenta to the intestine, draws an analogy between it and the ductless glands elaborating material which is secreted into the circulation.

In the later stages of pregnancy, when the placenta degenerates increasingly and the maternal and fœtal circulations are practically separated only by a capillary wall, serum proteid may pass unchanged, just as it does into the lymph. It seems difficult to explain otherwise how it is that the placenta becomes more and more degenerated, while at the same time the fœtus has greater and greater requirements.

I have again to express my indebtedness to Dr Cramer, who supervised and in large measure directed my work in the Physiological Laboratory.

*The President* thanked Dr Lochhead for his interesting paper on a difficult subject, and expressed his hearty wishes that the investigations commenced should be continued, and reported to the Society later. The subject was one which few of the Fellows could discuss extemporaneously.

# IV. ON THE OPERATIVE TREATMENT OF DISPLACEMENTS OF THE PELVIC VISCERA.

By W. E. Fothergill, M.A., B.Sc., M.D., Manchester.

In a recent paper[1] the writer has reviewed some anatomical work which seems to promise a welcome simplification of teaching as to the supports of the pelvic viscera. The present communication contains an attempt to indicate some practical applications of this anatomical work, which is now briefly summarised. Let it be said at once that etiology is not discussed below, the actual lesions and their surgical treatment being discussed without any reference to their various causes.

## Anatomical Considerations.

In the first place, it is necessary to realise that the so-called ligaments of the uterus lie loose and slack upon the subjacent structures, and have no supporting action. The round ligament is a vestigial structure corresponding to the gubernaculum testis, and its part is played during early fœtal life, when it pulls down the ovary and the uterus from their original positions into the pelvis. The broad ligament is a mere mesosalpinx and mesovarium. The utero-sacral ligament is a slack peritoneal fold containing a few muscular fibres with an attachment no more definite than the mobile wall of the rectum.

It is also necessary to forget the classical descriptions of the pelvic fasciæ, and to realise that these are not independent structures, but that the pelvic connective tissue is simply the undifferentiated remnant of the mass of mesoblast within which the pelvic organs are developed during embryonic life. Every part of this connective tissue is thus continuous with the rest, the denser portions being those which cover the viscera, the muscles, the blood-vessels, lymphatics, nerves, and other definite structures.

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[1] *Journal of Obstet. and Gyn. of the British Empire*, January 1908.

Further, it must be recognised that the superficial perineal muscles derived from the primitive sphincter of the cloaca have a purely sphincteric action, and that their contraction has no supporting action on the viscera.

Again, the levator ani and coccygeus muscles are the degenerated representatives of the muscles which move the tails of lower vertebrates. With the loss of the tail, these muscles have lost their range of movement, much of their muscular tissue, and most of their muscular function: though the lower margin of the levator ani co-operates with the sphincters of the rectal and vaginal canals in some degree.

The largely fibrous remains of these degenerated muscles, together with their connective tissue sheaths, form the major part of the structure known as the pelvic diaphragm. This musculo-membranous funnel can not be said to have any muscular action of a supporting nature. It may more justly be regarded as a somewhat elastic sling, and may be compared to a pair of hammocks suspended side by side, their contiguous sides fastened together through one half of their length, but merely lying in contact through the other. This structure could not, in virtue of its funnel shape alone, support a plastic mass like that formed by the pelvic viscera. Its two sides are separated with ease whenever the muscles of the sphincter layer are relaxed. Fæcal masses of considerable size pass easily through the rectal portion of the funnel; and the formation and muscularity of the pelvic floor offer no insuperable obstacle to the escape at term of the products of conception.

If they were supported only by the shape and the muscular action of the pelvic diaphragm and the muscles of the sphincter layer, the uterus, the bladder, and the vagina would certainly escape from the pelvis with every movement of the bowels and probably on many other occasions. This is indeed what happens in many women in whom the normal supports of the pelvic viscera have become elongated. These normal supports are the denser portions of the connective tissue which intervenes between the sides of the pelvic diaphragm and the sides of the pelvic viscera. The upper surface of the pelvic diaphragm is lined by fascia, the aponeurotic covering of the muscles which form it. The viscera have their own coverings of connective tissue. Part of the intervening connective tissue is loose, and part is dense. The dense part is that which forms the sheaths of the blood-vessels, the lymphatics, the nerves, and the ureters. These structures, together with their sheaths, form masses of tissue which extend between the sides of the pelvis and the lateral aspects of the uterus, the vagina, and the bladder, and which hold these organs in the position they usually occupy. The upper margin of each supporting mass is in a manner defined by the internal iliac artery and its direct continuation, the obliterated hypogastric artery. The mass is fixed behind by the internal iliac vessels, and is firmly attached to the innominate bone. The posterior branch of the artery anchors the mass near the sacro-sciatic notch. The obturator artery anchors it near the obturator foramen. The obliterated hypogastric artery fixes it to the abdominal wall. The uterine, vaginal and vesical vessels run downwards and forwards to the viscera. It is the connective tissue ensheathing these arteries and the accompanying veins and lymphatics which really fastens the viscera in their places.

The rectum has a separate vascular supply and a separate attachment to the back of the pelvis. It is thus independent of the other viscera, and lies loosely in a channel between the lateral masses of tissue which support them.

### PATHOLOGICAL CONSIDERATIONS.

*Classical Prolapse.*—Elongation of the perivascular connective tissue, briefly described above, must be regarded as the one essential and constant lesion in the pathology of classical prolapse of the pelvic viscera; namely, descent of the uterus and its appendages, with the bladder, urethra, and vagina.

No one who is in the habit of opening the abdomen and seeing the so-called ligaments of the uterus lying loose and flaccid will maintain that prolapse is in any way dependent upon elongation of these structures.

Again, there is ample clinical evidence to show that inefficiency of the pelvic floor is quite a secondary and accidental factor. For we constantly see women whose perineums have been badly lacerated, but who present no symptoms of prolapse. Indeed, in cases of complete tearing into the rectum, prolapse is the rare exception and not the rule.

Prolapse is not uncommon in virgins and nulliparæ; and in them the descending viscera quickly dilate the orifice of the pelvic diaphragm and overcome the action of the sphincter layer of muscles.

If the pelvic organs are loose, they will naturally descend more easily in a patient whose perineum has been torn than in one whose pelvic floor is sound; but inefficiency of the pelvic floor is a separable accident favourable to prolapse, not a cause of it.

The normal channel from the pelvis to the exterior is narrow and curved, the normal perineum forming a corner which must be turned by any escaping mass, fœtal or hernial. If the channel has been widened and straightened by tearing or stretching of the perineum, prolapsing viscera will descend more easily than they would otherwise do, but that is all.

On the other hand, if the normal attachments are tense and firm, no injury to the pelvic floor will make the pelvic organs descend.

A prolapsed uterus, in fact, is like a loose kidney, and has an elongated attachment. In other words, elongation of the pelvic perivascular connective tissue is the one constant and essential lesion characterising the pathology of the condition.

*Cystocele, Rectocele, and Vaginal Prolapse.*—In classical prolapse, or sacro-pubic hernia, the attachments of the uterus, the vagina, and the bladder are all relaxed. But it is possible for part of the perivascular connective tissue to be affected without the whole mass of supporting tissue becoming lengthened. Thus the bladder and anterior vaginal wall may descend in cystocele, or both vaginal walls may be everted, the uterus remaining anteverted and at its ordinary level in the pelvis.[1] In such cases the lower portion of the supporting mass is alone affected, the upper portion preserving its tension.

*Retroversion.*—The uterus itself is practically supported by the parametric tissue which lies below the free broad ligament, and above the vaginal fornices. This is the tissue which has been called the transverse ligament of the uterus. But it is not a definite ligament, as it consists of all the structures between the base of the mesosalpinx and the vaginal roof. Neither is it transverse, for the structures composing it run forwards and downwards to the cervix, following the course of the anterior division of the internal iliac artery.

It is possible for the parametric tissues to be elongated without relaxation of that which supports the vagina and the bladder. This allows the cervix to move or drop further forward in the pelvis than is normal, without permitting any cystocele or vaginal prolapse. When this condition pertains, some factor, such as over-distension of the bladder, can easily turn the fundus backward into the pouch of Douglas, and a position of retroversion thus established may either remain occasional and temporary, or may become permanent.

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[1] Rectocele, it should be mentioned, is a special condition, and an apparent exception to the rule that the rectum is independent of the other pelvic viscera. But in rectocele there is pathological adhesion of the anterior rectal wall to the posterior vaginal wall, the result of inflammatory infiltration of the recto-vaginal septum during the healing of infected perineal tears.

*Summary.*—Thus relaxation of different parts of the perivascular connective tissue gives different results:—

Relaxation of upper part alone = retroversion.
„ „ upper and lower parts = classical prolapse.
„ „ lower part alone = cystocele and vaginal prolapse.

## THE OPERATIVE TREATMENT OF DISPLACEMENTS.

### (A) *Classical Prolapsus Uteri* (*sacro-pubic hernia*).

If we accept the view above expressed as to the essential nature of prolapse, it follows that the truly surgical method of treatment would be to shorten the mass of tissue which attaches the pelvic viscera to the sides of the pelvic diaphragm. But there are obvious technical difficulties in handling a mass of tissue which contains embedded in it important arteries, veins, and lymphatics, as well as the ureters, and which is attached to the whole of the surface of the vagina, a large portion of the surface of the bladder, and to the lateral and anterior aspects of the cervix uteri.

The most that surgery can accomplish in this direction is to alter the attachment of the more easily accessible portions of this mass of tissue to the cervix and the upper part of the vagina in such a way as to "take up the slack" in some degree. Several operations have been designed with this intention. One of these is Alexandroff's operation (*Zeit. f. Gynäk.*, 1903, No. 25) in which a curved incision is made across the anterior vaginal fornix, so as to allow free separation of the bladder from the uterus and the parametric tissues. The bladder being pushed well up, temporary ligatures are passed into these tissues about an inch and a half from the cervix on either side.

These ligatures, when crossed and pulled upon, bring together the elongated parametric tissues in front of the cervix, which is thus lifted upwards and backwards in the pelvis. Sutures are then inserted so as to unite the tissues to one another, and to the anterior aspect of the cervix. The temporary ligatures are then removed, and the vaginal incision is closed. Hastings Tweedy (*Journal of Obstet. and Gyn. of the British Empire*, May 1905) has described a similar operation; but he recommends, as preliminary stages, opening the peritoneal cavity, both in front of and behind the uterus, and detaching the vaginal wall from the parametric tissues on either side.

In the north of England several operators have for many years done anterior colporrhaphy in a way which enables them to bring together in the middle line in front of the cervix a good deal of the parametric tissue and a good deal of the paravaginal tissue of either side without endangering the uterus or the blood supply of the parts. The operation, as done by the writer, is begun by cutting across the vaginal wall between the cervix and the bladder. This transverse cut extends into the lateral fornices for about 1½ ins. on either side of the middle line. The bladder is then separated freely from the cervix and from the vaginal walls down to about 1½ ins. from the urethral aperture. The vaginal wall is then freely cut away. The portion removed is roughly triangular in shape, its base being at the vaginal roof and its apex 1½ ins. or so from the urethral aperture. The bladder, and with it the ureters, is pushed well up and out of harm's way. The uterus is also pushed up into the pelvis, and sutures are inserted so as to unite the parametric and paravaginal tissues to one another and to the anterior aspect of the cervix. These sutures may be buried, or they may be made to include the margins of the vaginal wall, so that when tied they bring together the portion of the original incision which is nearest to the cervix. In either case the result is to unite in front of the cervix certain portions of tissue which previously were widely separated and lay at the sides of the cervix and vagina. This effectively shortens the supports of the organs in question.

As the lower part of the incision is closed, the sutures are made to penetrate the tissues underlying the vaginal wall, and thus the paravaginal tissue is drawn from the sides of the front of the vagina. This is an old and well-tried method of performing anterior colporrhaphy, and its value is undoubted. The anatomical considerations which introduce this paper afford a complete rationale of the success of this operation, by showing that the tissues which it moves from the sides to the front of the vagina and cervix are those of the most importance as normal supports of the viscera. It is thus a scientific operation which has been designed and carried out empirically, and is probably of greater practical utility than the newer operations proposed by Alexandroff and Hastings Tweedy for reducing to their normal length the connective tissue supports of the uterus and vagina.

It has been granted that relaxation or tearing of the pelvic diaphragm and of the perineum favours the prolapse of loose pelvic viscera by widening and straightening the canal through which they descend. Now, it is certain that the perivascular connective tissue, when once elongated, can never be perfectly repaired; and that pelvic organs which have once been loosened will always be loose. In every case, therefore, in which the operative treatment of prolapse is attempted, steps should be taken to improve the perineum and to narrow the vaginal canal, in order to check recurrence of the condition. In short, the operation of anterior colporrhaphy should always be reinforced by posterior colporrhaphy and perineorrhaphy. One of the most satisfactory ways of doing this is to work from above downwards, according to the method of Donald of Manchester, stripping a gradually widening tongue of the posterior vaginal wall from the rectum and the perineal body. The upper portion of the incision can be sutured before the lower portion is completed, and buried sutures may be used with advantage in forming the new perineal body. But the details of these operations may well be decided by each operator for each individual case.

The writer prefers in bad cases of prolapse to complete the operative treatment by ventrofixation. This is doubtless an unsurgical measure, but in practice it has proved to be a useful and harmless one.

It is necessary in many cases to leave the vagina large enough to permit coitus and parturition, and something further than the plastic operations on the vagina is thus frequently necessary. The writer is usually guided in deciding whether ventrofixation is necessary or not by the position assumed by the uterus after anterior and posterior colporrhaphy and perineorrhaphy have been done. If the uterus is then found to be anteverted, there is a good chance of permanent cure without further interference, but if the uterus is still in a position of retroversion, the prolapse will tend to recur.

Under these circumstances the operation of ventrofixation is the only one suitable, for the round ligaments cannot be trusted to give any permanent support to the loosened pelvic organs. All the operations performed by shortening these vestigial structures are uncertain in the treatment of prolapse. What is known as ventro-suspension is also useless for this purpose. What is required is permanent union between the anterior surface of the uterus and the posterior sheath of the recti.

The best time to do this operation is at the same sitting with and after the vaginal operations. This saves the patient three or four weeks in bed and a second administration of an anæsthetic, with its unpleasant after-effects. In certain cases it is doubtless necessary to defer the ventrofixation for a time.

The writer's usual course is to have the patient placed in the Trendelenburg posture immediately on the completion of the perineorrhaphy. In this posture ventrofixation can generally be done without putting any swab or sponge into the abdominal cavity, and practically without seeing or touching the intestines. The abdomen is carefully opened through the linea alba by an incision extending from the symphysis halfway up to the umbilicus. The appendages are then rapidly examined and the uterus is raised towards the incision by two fingers placed behind the fundus. With a vulsellum the anterior surface of the uterus is gripped below the level of the tubes and is gently drawn into contact with the abdominal wall in the lower part of the incision. At least four sutures are then passed, fine silk or hardened catgut being used. One is transverse and below the grip of the vulsellum; another is transverse, but above the grip. The other two are lateral, one on each side of the grip. The curved needle passes through the anterior sheath of the rectus, through the muscle and through its posterior sheath, but not through the peritoneum. After taking a good bite of the uterine wall, the needle returns through the same tissues, and the suture is tied on the anterior surface of the anterior sheath of the rectus. A square-inch of the uterine wall, with the portion wounded by the teeth of the vulsellum in its centre, is thus fastened to the posterior sheath of the rectus muscles. If the uterus is large and heavy, two lateral sutures are used on either side, so as to enclose a larger area. Extra transverse sutures may also be used. The peritoneum is excluded, by this method of stitching, from the area of union between the uterus and the abdominal wall. The operation is completed by uniting the peritoneum above and, if necessary, below the area of attachment. The fascia in front of the recti is then firmly united with interrupted sutures, and the skin edges are drawn into contact by a single subcutaneous suture of catgut.

Innumerable operations have been devised for the treatment of bad cases of prolapse in women who have passed the menopause. Bearing in mind the anatomical considerations which form the basis of this paper, it is clear that the main object should be to unite in the middle line of the body the parametric and paravaginal tissues. The removal of the uterus together with the upper half of the vagina certainly exposes a broad surface of tissue on either side, which can be united in the middle line behind the bladder with very satisfactory results. But, unless the uterus is in such an unhealthy state that it is better away, it must be but rarely advisable to submit a patient to a hysterectomy in order to cure a prolapse.

### (B) *Cystocele and Vaginal Prolapse.*

It has been mentioned that elongation of the lower portion alone of the perivascular connective tissue causes cystocele and vaginal prolapse.

The operative treatment of these conditions calls for no comment. It is conducted with perfect results by the ordinary operations of anterior colporrhaphy, posterior colporrhaphy, and perineorrhaphy. It is perhaps hardly necessary to insist that cases in which these conditions occur must be carefully distinguished from cases of prolapse in an early stage. The position of the uterus probably affords the best criterion. If the uterus remains anteverted, it is unlikely that the parametric tissues are elongated, and the case can not be regarded as one of classical prolapse. Any case, however, of descent of the anterior or posterior vaginal walls in which the uterus is retroverted should be regarded as an example of true prolapse of the pelvic viscera, and should be treated accordingly.

### (C) *Retroversion.*

It was stated above that in certain cases the attachments of the uterus itself, namely, the parametric tissues, are relaxed, while the supports of the bladder, the urethra, and the vagina remain normal: and that, in these cases, the bladder and vagina do not descend; but the uterus tends to assume a position of retroversion, with or without the change in form known as retroflexion.

It is needless to say that cases of this kind must be carefully distinguished from cases of early prolapse. From the practical point of view, only those cases should be called "retroversions" in which the position of the bladder and the vaginal wall is so perfect that there is no excuse at all for undertaking operative treatment by the vaginal route. In other words, if a case in which the uterus is retroverted can suitably be treated by a vaginal operation, it is really a case of early prolapse, and not a pure retroversion.

The treatment of retroversion and retroflexion is the subject of an old debate which is still unfinished. The question may be put as follows:—

It may be taken as granted, first, that many cases of retroversion present no symptoms and require no treatment; and second, that in many cases the retroversion is temporary, as, for instance, in early pregnancy and in the period following parturition, during which the involution of the pelvic structures remains incomplete. There remain the cases of chronic or permanent retroversion accompanied by symptoms. There is a mass of opinion to the effect that in these cases the retroversion should not be treated directly, but that local and general measures should be applied, with the view of relieving the conditions, congestive or inflammatory, which complicate each case. The object of those who favour this opinion is, of course, to turn each case of retroversion with symptoms into a case of retroversion without symptoms. This can often be done. But there remains a mass of opinion to the effect that the patient can often be cured most quickly, safely, and pleasantly by treating the retroversion itself, as well as the conditions with which it is associated.

Those who prefer to treat directly retroversion accompanied by symptoms argue as follows. Many painful and troublesome uterine conditions are caused by, or aggravated by, passive venous congestion. Retroversion often causes or increases passive venous congestion. Therefore it is worth while to treat retroversion when accompanied by symptoms, with the object of removing or at least reducing passive venous congestion.

The cases of retroversion, with or without retroflexion, in which operative treatment is available may be roughly divided into two classes. In the first class are those cases in which the uterus can be restored to a position of anteversion and in which this position can be permanently maintained, without discomfort to the patient, by means of a pessary. In the second class are those cases in which the uterus, on account of adhesions, cannot be placed in a position of anteversion, and those in which, on account of tenderness, prolapsed ovary, or some other reason, the uterus cannot be kept in anteversion by a pessary.

In cases of the first class, operative treatment is of the nature of a luxury, for health and comfort can be secured without it as easily as with its aid. As a mere alternative to pessary treatment, therefore, operation must be selected by the patient, who must take all responsibility. In cases of the second class, operative treatment is rather of the nature of a comfort. It may not be a real necessity; but it may be the only means of enabling the patient to enjoy her life or to do her work. In these cases operation may be strongly recommended by the operator.

As an alternative for pessary treatment the writer considers that Alexander's operation is allowable. While the round ligaments are not sufficiently reliable structures for use in helping to support a loose uterus, bladder, vagina, and urethra, they often suffice perfectly to prevent a loose uterus from tumbling backwards. In cases, therefore, in which the uterus is early replaced, and is not unduly large and heavy, Alexander's operation may well be done.

In cases of the second class, namely, those in which the uterus cannot be replaced in a position of anteversion, and retained in good position by a pessary, the abdomen should always be opened if it is decided to treat the retroversion by operation. For it is essential in these cases, which are mostly complicated by the chronic results of infective processes, that an exact diagnosis be made. The appendages may require treatment of a more or less conservative nature: they may have to be separated from adjacent structures, and adhesions which bind down the uterus must generally be separated, before the organ can be secured in a position of anteversion.

The Trendelenburg position should be used, so as to avoid, as far as possible, the placing of sponges or swabs within the abdominal cavity. When adhesions have been separated, and the appendages have been examined and treated, the operator must decide upon the method to be used for maintaining the uterus in anteversion. Of the innumerable ways devised for securing this object, one of the best is doubtless that described by Webster, who pulls a loop of each round ligament through a hole made in the corresponding broad ligament close to the uterus, and just below the tube and the ovarian ligament. The two loops of round ligament are made fast by stitches to the posterior wall of the uterus.

If ventrofixation is preferred, it may be done as described above for the treatment of prolapse. In many cases, however, there is no great strain on the attachment, the uterus simply requiring something to keep it from tumbling backwards. A mere peritoneal adhesion may be then preferred to firm union with the posterior sheath of the recti. In such cases the sutures which anchor the uterus are made to pass through the peritoneum instead of pushing it on one side. The essential features of the operation are that the attachment is on the anterior uterine wall, below the level of the tubes; that there is no tension after the sutures have been tied, and that the wound is so closed as to obviate all risk of hernia. Tension can be avoided, if necessary, by suturing the uterus to the peritoneum alone, instead of passing the sutures through the recti, and their anterior fascial covering. Some operators prefer to suture the bases of the round ligament to the abdominal wall on either side of the wound, and this is said to give very good results.

### SUMMARY OF OPERATIVE TREATMENT.

*Classical Prolapse.*—

1. Anterior colporrhaphy with union of the parametric and paravaginal tissues in the middle line. Posterior colporrhaphy and perineorrhaphy.
2. Ventrofixation in addition, if the anterior colporrhaphy does not support the uterus in a position of anteversion.

*Cystocele and Vaginal Prolapse.*—Anterior colporrhaphy and perineorrhaphy.

*Retroversion demanding treatment.*—

(*a*) *Uterus movable.*—Alexander's operation as an alternative for pessary.

(*b*) *Uterus fixed.*—Laparotomy, separation of adhesions, treatment of appendages, and securing of uterus in anteversion.

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*Sir Halliday Croom* remarked that the subject was one of extreme interest. It had often struck him when the abdomen was opened, that there was no appearance of the uterus being supported by the broad ligaments. These ligaments were loose. He quite agreed that the pelvic floor and structures took only a limited share in the support of the uterus. It was no uncommon thing to find the floor destroyed and the uterus in good position. It was important to draw attention to the support of the uterus. It was necessary to revise the methods of dealing with the anatomy of prolapse of the uterus in teaching the subject. He discussed operative treatment of displacements.

*Sir A. R. Simpson* thought Dr Fothergill had rendered assistance by drawing attention to the importance of relaxed tissue. But what brought about the relaxation of the tissue? The answer to this question might be of great importance. Dr Inglis Parson had suggested stiffening of the cellular tissue; this would produce the condition which was met with in cases of parametritis in which, even with a torn perineum, the uterus was fixed up and prolapse was prevented. Perhaps cellulitis might account for the absence of prolapse in some cases of ruptured perineum.

*Dr Ranken Lyle* thought that the cause of prolapse should be looked for, not so much in the cellular tissue itself, as in the character and inherent properties of the cellular connective tissue, in particular, its inherent elasticity. Out of twenty-five successive cases of procidentia he had only two cases where laceration of the perineum occurred, and in these it was not complete. In his last six cases of laceration of the perineum there was no prolapse of the uterus. He believed the explanation to be that there were two extreme types of patients: (1) in which the tissue was extremely soft and easily stretched—no tenacity, no elasticity; and (2) with tenacious and hardy structures. In (1) the structures stretch readily during parturition, and there is a tendency to procidentia, but not to laceration, while in (2) the structures were liable to tear, but there was less tendency to prolapse. Treatment should be directed to improvement of the tone of the connective tissue. He believed in Inglis Parson's operation, but such operations were unsatisfactory, because, owing to the inherent quality of elasticity in the tissues, cases were apt to be recurrent.

*Dr Freeland Barbour* welcomed the paper as suggesting a new way of looking at the question. The received views should not be discarded, however. There is room for both the old and the new ideas. Dr Fothergill stated that the round ligament played no part in supporting the uterus, but with this he could not agree. One had only to palpate the round ligament during labour to perceive how it assisted the support of the uterus. If the connective tissue alone was concerned, then labour had nothing to do with the question; but it was rare to meet with a case of prolapse except where there had been labour. He could not agree with the idea that the utero-sacral ligaments had no part in supporting the uterus.

*The President* briefly wound up the discussion.

*Dr Fothergill* thanked the Society for their kind attention. He had brought forward the subject mainly to sound their views, and had got what he wanted. He certainly believed that relaxation was sometimes congenital, and he himself had seen many cases of prolapse in virgins. He looked upon a loose uterus as comparable with a loose kidney.

## V. ON THE FROZEN SECTIONS BY BUMM AND BLUMREICH AND BY ZANGEMEISTER. IS THERE A LOWER UTERINE SEGMENT?

By A. H. Freeland Barbour, M.D., LL.D.

The crux of Bumm and Blumreich's argument is in the sentence quoted in the billet: "I do not think that two different interpretations should be allowed. The only solution of the difference of opinion is that one of us (either Dr Barbour or ourselves) is mistaken in his interpretation of the miscroscopic findings." And to prove themselves right, they make me wrong in the interpretation of my microscopic findings. In self-defence I have disinterred the microscopic sections of some eighteen years ago, and have had new photographs taken. "Another Druce case," I hear some Fellow of the Society wittily remark. It is, gentlemen, and the evidence goes to show that, in this case at least, the cervix did not masquerade as lower uterine segment.

While Bumm and Blumreich's paper, "Ein neuer Gefrierschnitt durch die Leiche einer in der Austreibungsperiode verstorbenen Kreissenden und seine Bedeutung für die Lehre vom unteren Uterinsegment," was read before the Gynæcological Society in Berlin in November 1905, the *Atlas* itself was not published till March 1907, and only came into my hands last autumn. At the same time I received also Zangemeister's section of a case of rupture of the uterus. The two sections I therefore consider together.

In this paper I propose to give:—

I. A brief historical sketch of the present view regarding the lower uterine segment.
II. A statement of the position taken up by Bumm and Blumreich.
III. A criticism of that position.
IV. A note on Zangemeister's section.

## I.

An historical sketch of the "Lehre" concerning the lower uterine segment, which goes back to Birnbaum's *Habilitationsschrift* in 1841, is necessary to understand the significance of the question at issue. The term "Lehre" is one of those untranslatable German words; it might be rendered "teaching," "received view," "theory," or "opinion," none of which are, however, adequate. Were it not pedantic, I should borrow the theological term: "the development of the doctrine" regarding the lower uterine segment.

Braune's classical section (3),[1] published in 1870, of a woman who had drowned herself while labour pains were going on, showed labour in the second stage, an unruptured bag of membranes at the vulva, and what he described as the "cervix uteri" stretched until it measured 4·4 in. (11 cm.) in front, and 4 in. (10 cm.) behind. No microscopic examination of the tissues was made, and the soft parts had to be destroyed, so as to construct the bony skeleton. Braune himself said to Sänger that he could not recall all the particulars which led him and Schatz to mark the line in question "orificium uteri internum."[1]

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[1] The figures in brackets refer to the literature given at the end of this paper.

Four years later, Bandl (4) wrote that in his former paper, on "Rupture of the Uterus and its Mechanism," he had not clearly understood the relations of the cervix, thinking that the long cervix of Braune's section was produced by labour. The object of his present paper was to prove that it was developed slowly during the last three months of pregnancy. He accepted Müller's (2) description of the cervical canal as measuring at the end of pregnancy from ¾ to 1¼ ins. in length, but was not satisfied that it represented the whole 1·4 ins. virgin cervix of Henle and Luschka. Were the cervix of Müller stretched on the fœtal head in the second stage of labour, it would become "thin as a gold-leaf." Braune's cervix of labour, therefore, cannot be Müller's cervix of pregnancy, but includes a portion of the cervix which, during the later months of pregnancy, has become converted into the lower uterine segment.

The frozen section by Chiara (5), taken from a iv.-para who died of syncope during spontaneous version of the fœtus, and published in 1878, drew attention to the thinning that the lower portion of the uterus undergoes in cases of impacted transverse presentation, without giving exact anatomical data as to what is cervix and what is lower segment. It is a snapshot of the fœtus during the act of spontaneous version: "caught in act by corpsy congelation," as the English translation of the text, with an unconscious touch of humour, phrases it.

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[1] Sänger, "Ein letztes Wort zur Cervixfrage," *Deut. Med. Wochenschr.*, Nos. 24 and 25, 1882.

Passing over contributions by Angus Macdonald, Leopold, Müller, Langhans, Sänger, and Marchand, we come to an important monograph by Küstner (6) on the "lower uterine segment." He had previously written on the separation of the membranes, previous to and in connection with the onset of labour, in the *Archiv für Gynäkologie* (1877-8), and now describes numerous specimens from the non-pregnant, pregnant, and puerperal conditions, studying especially the changes of the mucosa in the neighbourhood of the os internum. He found that the mucosa of the upper part of the cervix was very similar to that of the part of the body immediately above it, both in the form and shape of the cells and in the arrangement of the glands. From this he concluded that the upper part of the cervical mucosa underwent changes similar to the lower part of the body, and that the fœtal membranes might come to adhere to a decidua formed from the cervix. He adds: "No anatomical proof is needed of the fact that in the case of primiparæ in the last weeks of pregnancy frequently—perhaps very frequently—does the pre-existing cervical canal experience a funnel-like dilatation, while in the case of multiparæ such a funnel-like dilatation does not occur."

The received view is that the stimulus of the growing ovum causes the mucosa of the body of the uterus to hypertrophy into decidua, and that this change extends down to the cervix, stopping at the os internum. Küstner's view is that the change does not necessarily stop there, but that the decidua may extend some distance down the cervix. There is no doubt that what he describes does occur in certain cases; no one can read his account of the specimens described without admitting this. The question is: Is such a process the rule or the exception?

Another important contribution to the *Lehre* of the lower uterine segment is Bayer's monograph (8), in which the mus-

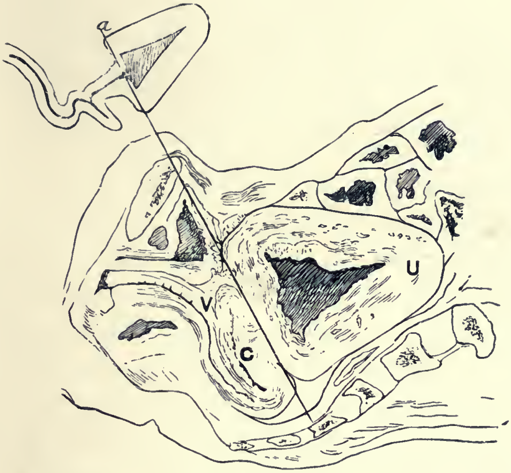

Fig. 1.—Author's Frozen Section of a Patient who died immediately after Delivery, from Hæmorrhage. (¼.)

The genital tract falls into two portions at the line *a*. U is on the firm, thick, contracted uterus; C on the folded part beneath it (cervix and lower segment); V on the vagina. The folding and doubling up of the canal at and below *a* show its limpness; and the small diagram above, representing the genital tract alone, is intended to bring out the separation of the parturient canal into two parts at this line.

cular architecture of the gravid uterus forms the basis of his conclusions. Under the suggestive title of "The Pregnant Uterus and the Laws of its Unfolding," he describes the musculature of the pregnant uterus in the various months of gestation, stating that "the sliding of the inner layer upon the outer layer governs the whole changes of pregnancy during the early months." This is, according to Bayer, a law of the unfolding of the pregnant uterus. Like Küstner, he finds a transitional mucosa on the lower segment, the cervical mucosa being transformed so that it produces a decidua exactly resembling the decidua formed from the uterine mucosa. Bayer, however, rejects Küstner's position, and adopts so far the accepted view that the stimulus of the growing ovum radiates over a perfectly well-defined area and stops there. This is the case, he holds, for the first four months of pregnancy, but he maintains further that by that time the growing ovum has dilated the uterus up to the point where the hypertrophied mucosa ceases, and that as growth still advances, the formation of decidua gradually extends beyond the original definite limit. The weak point in this position is that the stimulus which operates on the cervix and makes it form a decidua must be purely mechanical.

Granting, for the sake of argument, that the cervix is opened up, it will be merely stretched and nothing more, and this form of stimulus should lead rather to atrophy of mucous membrane than to growth. Briefly contrasting these two views, we may say that hypertrophy of the cervical mucous membrane before the ovum has begun to distend the cervix (Küstner) is intelligible; but absence of that hypertrophy before dilatation and then production of it afterwards (Bayer) is unintelligible.

I have taken Küstner's and Bayer's papers together for the sake of comparison, although it was before Bayer's was published that I laid before this Society my first frozen section (7), taken from a patient who died of post-partum hæmorrhage one and a half hours after delivery (*vide* Fig. 1). In describing it, along with other post-partum uteri, I drew attention to the way in which the limp and thin cervix lay folded beneath the firmer uterine wall. In that paper I described the flaccid portion as cervix only, but subsequently (19) as representing cervix and lower segment.

In the same year as Bayer's paper, there was published a further frozen section from the second stage, which formed an important advance in our knowledge of the condition of the cervix and lower segment. In it for the first time the naked-eye appearance of a frozen section was supplemented by a careful microscopic examination. It is that of a primipara, aged 29, who died of tuberculosis. The vaginal orifice showed the remains of the hymen, a short distance above which is the distended bag of membranes, and behind this the fœtal head lying in the first position. Chiari's section (9) has been adversely criticised, both by Doederlein and Bumm, because it does not show a retraction-ring, and is held to be of less value, inasmuch as the smaller fœtus means less resistance to the advance of the head, and less stretching of the soft parts. This criticism does not seem valid, and the fact remains that in Chiari's section we have a cervical canal represented by an area lined with columnar epithelium and glands characteristic of the cervix and extending for about 1 in. (2·3 cm.). This ends abruptly above, and the next surface shows decidua in patches. Higher up is a white line due to the folding of the membranes, the amnion being separated from the chorion and decidua, and running straight across, while the chorion and decidua beneath it are detached from the uterus and thrown into numerous folds. From this line down to where the cervical mucosa begins, the area measures 1·6 in. (4 cm.) and shows decidua to be present, but thinner than higher up in the uterus. Chiari says he has no objection to identifying the area where the separation of the membranes begins with Schroeder's contraction-ring, and to calling the portion below it uterine segment, characterised by

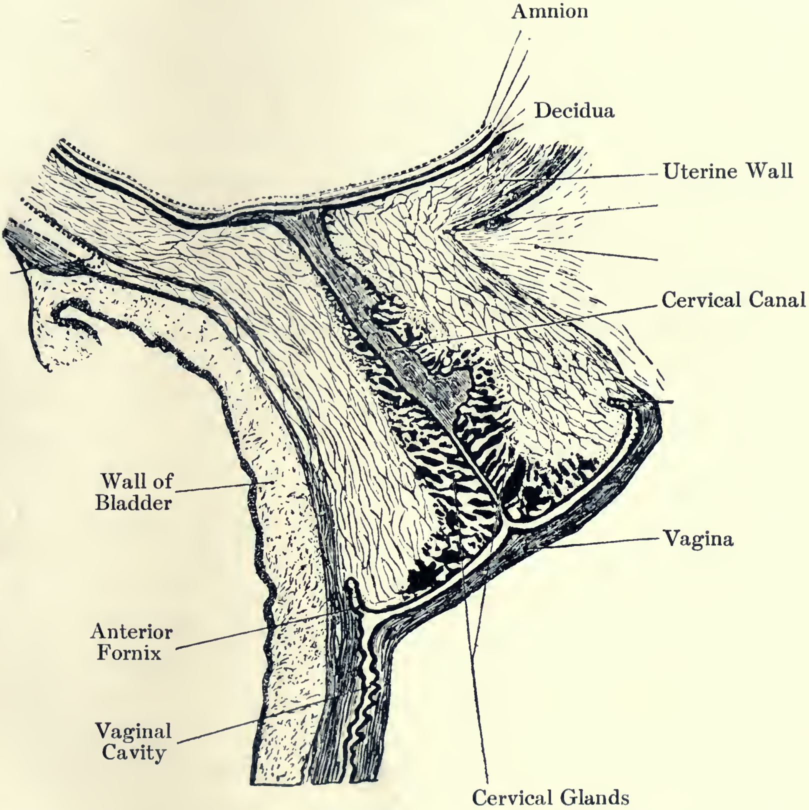

FIG. 2.—Waldeyer's Section through the Cervix, with portions of Bladder and Vagina—rather more than life-size—from a case of Full-time Pregnancy.

the thinness of its decidua and of the muscular wall; but *the os internum is where the decidua stops and cervical mucosa begins, and the cervical canal measures only* ·8 of an inch (2 cm.). (The italics are my own.)

In the following year (1881), Waldeyer (10) published his vertical mesial section of a x.-para, who died at full-time, death being the result of hæmorrhage a few hours after both legs had been cut off by a locomotive. The interest of this section lies in the fact that the cervical canal is divided throughout (this was not the case in Braune's section of pregnancy at full-time), and that the cervix and adjoining parts were subjected to careful microscopic examination. This section is so interesting that I have reproduced it (Fig. 2). We note that the cervix is divided mesially, the membranes crossing at the os internum, and the cervical cavity is filled with mucus. The canal measures 1·44 ins. (3·8 cm.); its wall is ·72 in. (1·8 cm.) thick below, and ·4 in. (1 cm.) above, the mucous membrane thickening from above downwards. The membranes consist of the amnion, chorion, and several layers of epithelial cells, and pass over the os internum without any change except that the layers of cells become thinner.

In the same year appeared two other frozen sections from the first stage of labour and immediately after delivery, published by Schroeder and Stratz (11 and 12). Schroeder's section was a iv.-para, aged 28, who died in the first stage of labour, within a week of full-time, the cause of death being a condition of the heart and lungs. The cervix was dilated to the size of the palm of the hand, and the membranes were unruptured. I give the drawing of the cervix and lower segment from Schroeder's specimen (Fig. 3), as it has a bearing on the definition of the lower segment to be given later on.

Stratz's frozen section of a primipara, aged 28, who died after the operation of perforation of the after-coming head for a contracted pelvis, is reproduced in Fig 4. It shows a well-marked contraction-, or rather retraction-ring, below which is a thin portion which he describes as consisting of cervix and lower segment.

A year later, Benckiser (13) described specimens from pregnancy, rupture of the uterus, and the puerperium. He finds the membranes in pregnancy firmly attached up to the edge of a 1·7-inch long cervix, and holds that his preparations speak for the persistence of the cervix in pregnancy. Associated with Benckiser was another of Schroeder's pupils, Hofmeier, who investigated the condition of the uterine muscle, showing that the muscular bundles are more easily separated from one another in the lower segment than in the upper part of the uterus. Benckiser's conclusion is that the lower uterine segment is sharply marked off, and springs from the body of the uterus—not from the cervix.

In the same year (1887), I laid before this Society a summary of all the uteri described during the previous ten years from the various months of gestation from the fourth month onwards, the result of which was to show that there is a canal of pretty constant length lined by the characteristic mucous membrane (14). Its walls are thicker than those of the non-pregnant uterus; and in the later months contrast sharply in texture with the wall of the uterine cavity immediately above. The relation of the membranes varies greatly in these specimens. While in some cases they are closely adherent up to the end of the canal, in others they are loosely attached, and even quite free for a considerable distance ; and the mucosa covering the lower segment is a typical decidua which in a few cases shows a character transitional from cervical mucous membrane.

I also showed a section from the first stage of labour of a vi.-para, who died from acute enteritis. In working up this case, I made use of coronal as well as vertical mesial sections, and reproduce one of these here (Fig. 5), on account of its

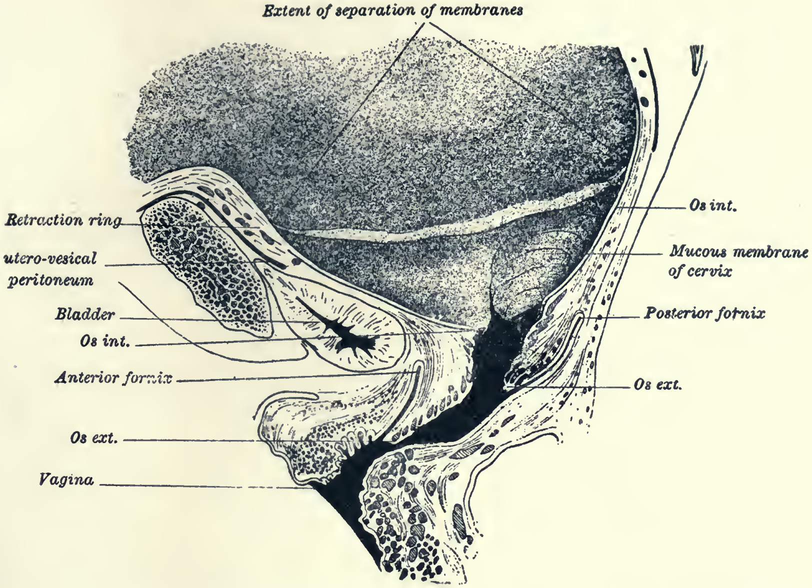

FIG. 3.—From Schroeder's Section of a Quartipara who died towards the end of the Second Stage.

The head of the fœtus and liquor amnii have been removed. Note that there is an area of internal surface of the uterus corresponding in extent to that from which the membranes have been separated.

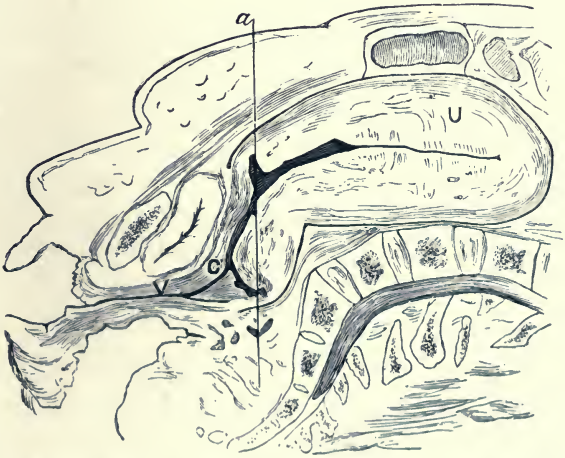

FIG. 4.—Stratz's Frozen Section of a Primipara who died immediately after Delivery. (¼.)

Letters as in Fig. 1. The contracted pelvis has kept the uterus high in the abdomen, and the walls of the canal below taut.

exhibiting the lateral relations of the lower segment. It has also a bearing on Zangemeister's section of the uterus.

In 1888 Saexinger (15) published his frozen section from the first stage of labour, which was followed in 1889 by two sections, also from the first stage, by G. Winter. These sections I considered in a paper read to this Society (17), noting the higher position of the utero-vesical peritoneum, the greater thinning of the wall below it, and a more extensive separation of the membranes, showing that the pains during this period are expended in thinning the lower segment of the uterus, as well as in dilating the cervix. In the same volume of our *Transactions*, in considering "The light which Sectional Anatomy will throw upon the Anatomy of Labour" (20), I drew attention to the importance of making sections in other planes of the pelvis besides the vertical mesial.

It was in that year that there came into my hands the material from which Webster and I published the section of a patient who died towards the close of the second stage of labour, which has given rise to considerable discussion. The cause of death was failure of the heart, and the child's head was on the perineum, so that the case was fitted to throw important light on the condition of the cervix and lower segment towards the end of the second stage. The results of our inquiry were published first in the *Reports of the Laboratory of the Royal College of Physicians* (21), where the investigation was carried on; and their practical bearing was discussed at the Birmingham meeting of the British Medical Association (22), held in the following year. A word of personal explanation is necessary as to the form in which these sections were published, as it has given rise to criticism. In the Laboratory Reports only reduced drawings were given of the sections, which have not the same value as the sections themselves; but as they were published in this form, I delayed the reproduction of the original drawings until a third edition of my *Atlas of the Anatomy of Labour*

(18) was called for in 1896. Nor was any microscopic drawing given of the cervix in the Laboratory Reports, in which it was, however, stated: "The os internum cannot be accurately placed, the parts not yet having been examined microscopically." The microscopic examination was, however, made about that time—not omitted altogether, as Doederlein regrets, nor made several years after the publication of the section, as Blumreich affirms. The delay in the publication of my Atlas does, I admit, give ground for such statements. I may mention also that the plate is taken from a micro-photograph of a single section (in this the cervix measures anteriorly 1·7 ins. and posteriorly 1·3 ins.), the unsatisfactoriness of which, as far as giving a complete demonstration goes, is admirably stated by Bumm and Blumreich in the paragraph introductory to the description of their own microscopic results, to which I shall refer immediately. So much by way of explanation.

In 1890 Braune and Zweifel published a frozen section (21) of a primipara, who died suddenly in the ninth month of pregnancy from failure of the heart. A series of lateral sagittal sections were made, and the interest of the text is that the section is discussed by Braune, to whom we owe the first frozen section of a case of labour, and also by Zweifel, whose position with regard to the cervix and lower segment is different from what he takes up in his criticism of two sections published three years later. Braune finds in this case a canal 2·6 cm. (rather more than 1 inch) in length. He says that the lower segment, recognised by the thinner muscular wall, extends from os internum upwards to contraction-ring for rather more than 2 inches (5·5 cm.). In the obstetrical part, Zweifel says that "a distinct, long-continued activity of the uterus must be excluded, because the cervical canal is maintained through its entire length, and there is no trace of a contraction-ring." Braune and Zweifel differ as to the presence of a contraction-ring.

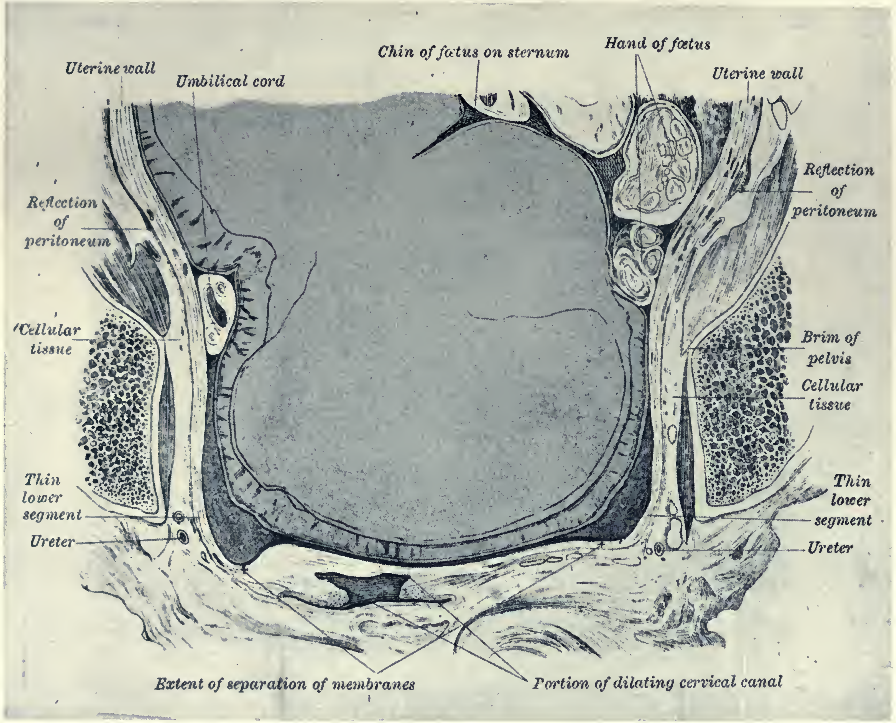

Fig. 5.—Author's Coronal Section of a Sextipara who died in the First Stage of Labour.

The reflection of the peritoneum is above the brim of the pelvis, and below this there is only cellular tissue in relation to the uterine wall, lower segment, and cervix. The fœtal head, which lay in the transverse diameter, is divided antero-posteriorly.

The next four frozen sections do not carry us much further in our knowledge of the lower uterine segment. Von Mars' (24) is from a case of rupture of the uterus, in which the retraction-ring is 6½ inches distant from the os internum anteriorly, while posteriorly it is 3¾ inches—the increase in length in front being partly due to the anterior rupture. Acconci's section (25) is from a case of placenta prævia, which was published later in an Atlas by Tibone. In studying the lower uterine segment, Acconci draws attention to the elastic tissue present in the cervix, and thinks that its elastic contraction pulls on the lower segment and causes its thinning. Soffiantini's section (26) is from the sixth month of pregnancy, and is not reproduced with sufficient accuracy either in drawing or colour to be of use in studying this question. Pestalozza's section (27) is one of the third stage of labour. Pestalozza gives also a section of a vi.-para, who died when labour was commencing, showing separation of the membranes, but the section does not pass through the cervix.

In the same year (1892), however, a section published by Testut and Blanc (28) of a primipara, who died from eclampsia at the sixth month, leads the authors to discuss the lower segment, and to come to the conclusion that it is present in pregnancy during the eighth and ninth months, and in all cases of labour, whether premature or at full-time. They hold that its anatomical characters are not well defined—that it is more a condition to be determined clinically.

Pinard and Varnier's beautiful *Atlas of Obstetrical Anatomy* (29) represents mostly sections of uteri removed from the body in the third stage or post-partum, or sections from cases that died in pregnancy or at the commencement of labour. The microscopic anatomy of the lower segment is not detailed; but the extent of separation of the membranes in the cases from the first stage corresponds to the degree of dilatation.

In 1893 Zweifel published sections from two unique cases: of rupture of the uterus, the child's head only being born; and of placenta prævia, the child turned but not delivered. In both cases the pelvis only with genital organs could be removed, and was frozen. I have already discussed these sections (31), and refer here only to the point which led him to raise the question again as to the parts into which the genital tract is divided—that is to say, whether there is a lower uterine segment, or only a stretched cervix. In both of these preparations he supports the latter view. In the case of rupture no microscopic examination is given, and the os internum is defined from the firm attachment of the membranes. But the membranes are always detached for a considerable distance above the os internum—they must be so, to allow of the formation of the bag of membranes. In Chiari's case and my own they were detached almost to the retraction-ring. If, by defining the os internum by the attachment of the membranes in this case of rupture, Zweifel means that the membranes were attached up to the ridge which he *calls* the os internum, no stronger evidence could be adduced that this is not the os internum, but the retraction-ring. In the placenta prævia case, he makes the os internum coincide with a ring in the genital tract distant from the os externum 3·8 ins. (9·5 cm.) in front and 3 ins. (7·5 cm.) behind. No microscopic sections are given; all we have to go upon is this sentence in the text: "Above the ring which is evident in Plate VIII. (the naked-eye section) is decidua, below it is cervical mucosa; up to this ring there are attached on the right side of the body, membranes." The fact that the membranes were attached up to this point on the right side seems to me pretty strong evidence that this is not the os internum. It is difficult to see how the cervix could dilate, the hand be passed into the uterus and the fœtus turned, without separation of the membranes. As we shall see immediately, our definition of the lower segment must be partly in terms of that area of the lower pole of the uterine cavity from which the membranes are detached during the first stage. In studying the plates, and reading the text of Zweifel's Atlas, we do not find justification for the statement that "these two new frozen sections both microscopically and macroscopically give an entirely satisfactory and unchallengeable demonstration that such an enormous stretching of the cervix [as was present in Braune's section] is possible, and as a matter of fact was present in both these preparations." He apparently adopts Bandl's view, for he goes on to say that "above the actual cervical canal there is formed towards the end of the pregnancy from the wall of the body of the uterus and from the cervix an entirely new structure, an entirely new cervix." This position, we shall see, is different from that taken up by Bumm and Blumreich.

Doederlein's paper (30) is an excellent *résumé* of all the frozen sections published up to date.

An important monograph on the cervix and lower uterine segment appeared in 1897 by von Franqué of Würzburg (34). In it he describes 34 uteri in the Würzburg Museum, from pregnancy, labour, and the puerperium, and in addition to his own material, gives a table of all the specimens carefully described in the literature of this subject. These amount in all to 117 uteri from pregnancy, 20 from labour, and 75 from the puerperium. The points noted in his tables are the same as in one I laid before this Society (14), giving the uteri that had been described up to that date (1887)—the length of the cervix, position of the reflexion and of the firm attachment of the peritoneum, the thickness of the wall, and the condition of the mucosa with the attachment of the membranes. His conclusions, based on the bringing together of this large amount of anatomical material, may be thus summed up:—"The os internum remains closed during pregnancy unless pains are present, and there is no constant difference between the length of the cervix in primiparæ and multiparæ. The length of the cervix at the various months of gestation varies within certain limits. It grows slightly in length in pregnancy. There is no evidence of its being taken up to form part of the cavity in which the ovum develops. In labour it does not become essentially elongated, the elongation from stretching being counteracted by shortening from dilatation."

Leopold's Atlas, *Uterus und Kind* (35), with its thirty plates of the pregnant uterus from the first weeks up to full-time, while containing no frozen sections of the cadaver, brings together a large amount of material for studying the condition of the cervix and lower segment. He endorses v. Franqué's conclusions, stating that, even at the ninth month, no part of the cervical canal is taken up to cover the ovum, though when pains are present a funnel-shaped depression forms, consisting of the upper part of the cervical canal. He also agrees with v. Franqué in his endorsing Pestalozza's conclusion that the thinning of the lower uterine segment precedes dilatation of the cervix—a point which I had previously drawn attention to.

In Lusk's frozen section (37), the post-mortem changes prevented conclusions being drawn with regard to the decidua and the mucosa.

I do not here discuss the ingenious hypothesis of Aschoff (39), Professor of Pathological Anatomy at Freiburg, that there is an "os internum histologicum" situated at a lower level than the "os internum anatomicum," the area between the two belonging to the cervix, and corresponding to the isthmus uteri. It makes the uterus differ from other hollow viscera with a canal of outlet, in that its muscle-os does not correspond to its mucosa-os. It places a no-man's-land at the disposal of the ovum. To use his own words: "The isthmus becomes converted into the lower segment as far as is necessary for the attachment of the ovum. This may occur completely. . . . Whatever of the isthmus is not used up for the attachment of the ovum . . .

should not be reckoned to lower uterine segment." The lower uterine segment develops, therefore, according as to whether the ovum makes use of this additional space to add to its "Eikammer," or does not. A deduction from this hypothesis is that while the mucosa undergoes the necessary changes—for it becomes converted into a decidua, and the ovum is attached to it—the muscular tissue does not respond in the same way, for a muscular wall is produced which cannot retract, and therefore lies paralysed at the end of labour.

This theory is propounded to harmonise the different conclusions of Bandl, Küstner, and Bayer, all of which are accepted, and to bring them into line with Ruge's clear-cut and uncompromising attitude as to the mucosa. In the present state of our knowledge, it leads to confusion, rather than clearness of thought in dealing with a complex subject. So far as I can make out from the report of the discussion at the Berlin Obstetrical Society, this view, while accepted by Hartmann, was rejected by Bumm and Blumreich, Strassmann, and Ruge.

## II.

We pass now to a statement of the position taken up by Bumm and Blumreich, which amounts to this—that there is *no* lower uterine segment: that what has been described as such is simply stretched cervix. Their position is different from that taken up by Bandl, Bayer, or Küstner. Bumm says: "Pregnant uteri can only give information as to the state of the cervix during pregnancy; and in this connection Schroeder's thesis as to the cervix remaining in its normal condition up to the end of pregnancy may be accepted—except that we must remember that some weeks before birth, as is shown in such an excellent preparation as you have just seen, there is already a certain opening up of the cervical canal. According to the observations we have made in our course of obstetric palpation every term, this is not at all a rare occurrence; but the mucous membrane still retains its own particular epithelium and glands. In the unfolded parts of the cervix, and when the epithelium is smoothed out by the pressure of the fœtus, there is no question whatever of a decidual transformation: *cervix remains cervix.*" I quote this passage to show that Bumm dissociates himself from all of those who have attempted to get over the difficulty of the origin of the lower uterine segment by the thesis that before it came to be stretched in labour part of the cervix had changed its histological structure, so that, if we may use the expression, it might pass for the lower part of the body. The question is thus narrowed down to a clear issue—*Can the cervix, as we find it at the end of pregnancy, contribute enough tissue to be stretched round the head of a fœtus?* This Bandl held to be impossible, saying it would become as "thin as a gold-leaf."

Bumm and Blumreich's thesis that there is no lower uterine segment is based on a study of the case of which I show you the frozen section (see Plate II.), and the clinical facts are the following:—

The patient, a primipara, aged 39, after having labour pains for seventeen hours, the membranes rupturing during an examination ten and a half hours after the onset of the pains, died suddenly—apparently from pulmonary embolism. During the first stage there was moderate bleeding for a short time, and between the bag of membranes and the cervix small quantities of blood-clot were noticed on examination. The child is in the first position—L.O.A.—with its head deep in the pelvis, the cervix well dilated.

The Atlas contains seven plates, five of the frozen section showing the vertical mesial—the fœtus in position on both sides, and the uterine cavity, both halves. The sixth plate is a micro-photograph of the anterior and posterior parts of the

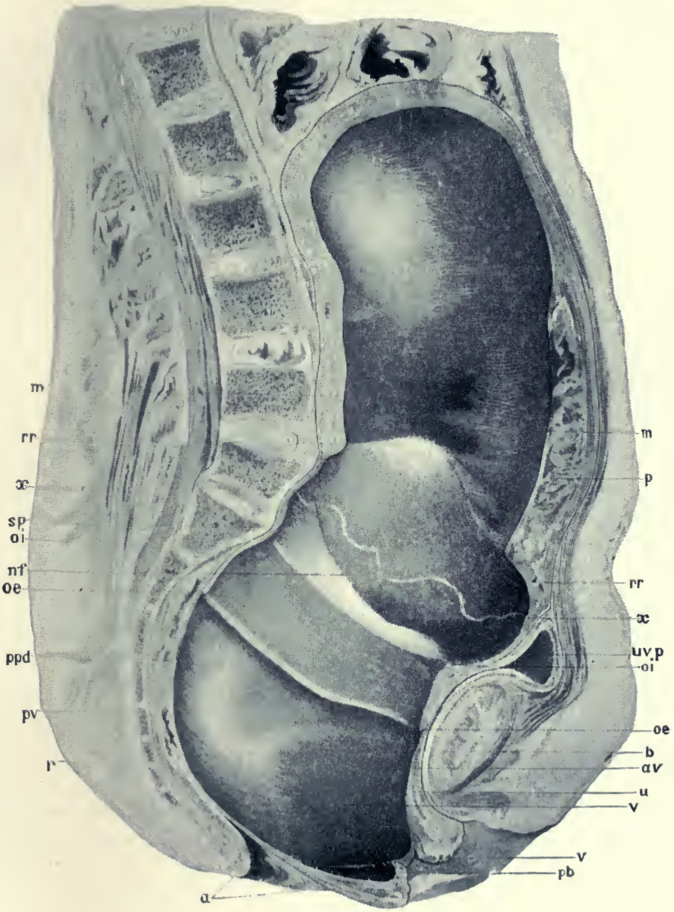

PLATE I.

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disputed area, enlarged eight and a half and ten times; and the seventh shows microscopic sections of a uterus from the ninth month, before labour, which has a bag of membranes separated by a layer of mucus from the lower pole of the uterine cavity, into which the cervical glands extend. It gives also a section of typical cervical glands found 0·6 inch below the retraction-ring, and glands found 0·2 inch below it, which are lined in part with a high epithelium, in part with an endothelium, the space containing mucus. Two other sections are given showing how the amnion and chorion may become applied to the surface and *seem* to be united to it.

The description of these microscopic sections is prefaced with the following pregnant paragraph. "Nothing seems simpler *a priori* than to ascertain the texture of the tissue from its microscopic appearance, but we did not find it at all easy to draw conclusions from the preparations we examined. The tissues had been considerably damaged by the lacerations of labour, and by the six days' freezing process; and just in the parts which concerned us most, the superficial layers of mucous membrane in the stretched zone were in places very much injured. We had consequently to examine a great number of sections; and only by the comparison and combination of these were able, after many erroneous interpretations, to arrive eventually at the truth. It was impossible to learn all the significant facts from one section, owing to the unsatisfactory preservation of the mucous membrane."

The paper in the *Zeitschrift. f. Geb. u. Gyn.* falls into two parts. The first is by Blumreich, who, after giving the clinical history and the mode of making the frozen section, draws attention to points in the naked-eye anatomy: first, the position of the bladder, which he rightly says has no bearing on the relations of the cervix; then the firm attachment of the peritoneum, which he finds only 2 mm. above the utero-vesical reflection. The pelvis is normal, with a conjugata vera of

4½ ins. The bladder is empty, two-thirds of it lying below the brim. The projections on the uterine wall are described and shown to correspond to depressions on the fœtus, with the exception of one ring-shaped ridge which goes almost round the whole circumference of the uterine cavity. This ridge is not marked in front, the appearance of the contraction-ring being simulated by the presence of the placenta, but it is well marked posteriorly. The chief facts visible to the naked eye are thus summed up:—"First in importance is the point of attachment of the peritoneum, in front, immediately below the insertion of the placenta, and behind, 0·6 inch below the projecting ridge of the contraction-ring; then the division into two parts of the genital tract—the lower part with its wall very much stretched, and the upper with a considerably thicker wall, separated from one another by a sharply defined projecting ring, which is about half of its circumference, shows a distinct contraction, where the wall is considerably thicker than it is above and below it."

In the second part Bumm begins by stating that pregnant uteri only give information as to the state of the cervix during pregnancy, and, as already quoted, he accepts Schroeder's position here. He discards uteri from the third stage, and the puerperium as not throwing light on the retraction-ring, accepts Leopold's description of the different stages of dilatation given in the twenty-ninth plate of his Atlas *Uterus und Kind*, and states that there is no thinning of the wall of the lower uterine segment during the first stage—the apparent thinning in frozen sections being due to pressure of the contents. "Even where the cervix is fully dilated and the opening of the os externum is far advanced, there is no indication whatever of a contraction-ring." The study of the question is, therefore, limited to sections taken from the second stage, and cases of rupture of the uterus or placenta prævia are rightly excluded.

The available material is therefore limited to four sections

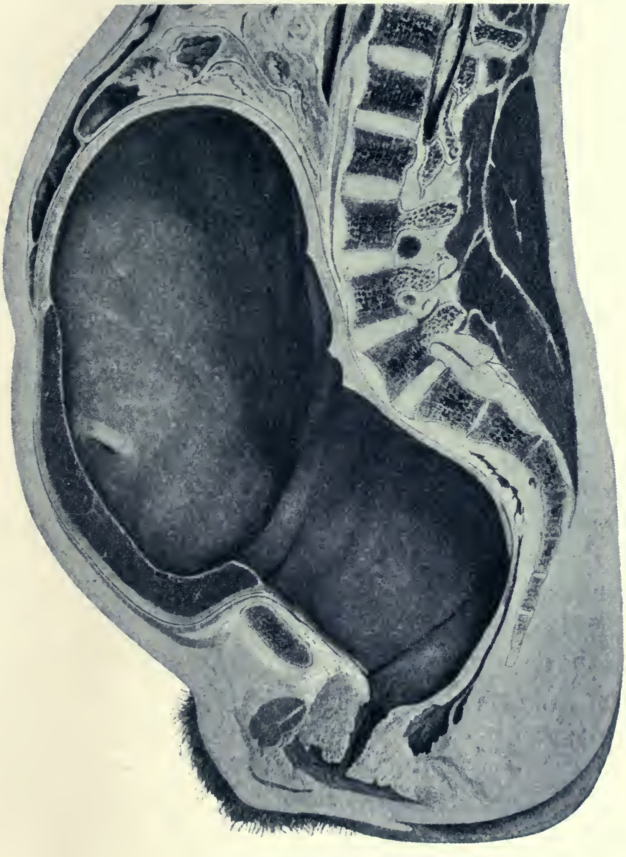

PLATE II.

[*Face page* 162.

—Braune's, Chiari's, my own (see Plate I.), and their own. In Chiari's case the fœtus was small, and there is no contraction-ring; it is therefore discarded. In Braune's no microscopic examination was made, and therefore the question is narrowed down to my own and theirs, in which "the two results directly contradict one another. . . . Considering the great similarity between the two sections, I do not think two different interpretations should be allowed: the only solution of the difference, in my opinion, is that one of us (either Barbour or ourselves) is mistaken in his interpretation of the microscopic preparation." He then criticises the micro-photograph published in my Atlas, and believes the membranes attached to the uterine wall to be an artificial production, the result of the method of preparation. To show that such a mistake might be made, he publishes miscroscopic sections in which such an appearance has been produced artificially.

## III.

We come now to the criticism of the position taken up by Bumm. And first we note that their case was that of an elderly primpara, the patient being aged 39, which may account for the extreme thinning of the cervix, to be referred to later on. Also, it was a case of partial placenta prævia, the placenta extending as far as what Bumm describes as the os internum (certainly in part over the lower uterine segment), which accounts for the hæmorrhage during the first stage.

Two points are raised in their paper—(1) The position of the retraction-ring; and (2) whether there is a lower uterine segment in addition to the stretched cervix. With regard to the first point, they rightly draw attention to the bulgings of the uterine muscle produced by depressions on the contained fœtus—a point which I drew attention to,[1] contrasting the difference between the behaviour of the uterine wall in the first and second stage—that in the first stage it moulds itself on the surrounding bony parts, while in the second it moulds itself on the fœtus. That the retraction-ring always develops at the os internum I do not concede, because there is just as strong evidence in my own section, as we shall see immediately, that it has developed at a higher level, as there is in their case that it has developed lower down. The main point at issue, however, is the character of the lining of the stretched portion of the canal, and we proceed, therefore, to a comparison and criticism of the micro-photographs of the two sections.

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[1] *British Medical Journal*, 1890, vol. ii., p. 1055.

### *Criticism of Micro-Photographs.*

The micro-photographs of the cervix from their Atlas and mine laid side by side, form an interesting contrast.

As regards the anterior wall, the utero-vesical reflection of the peritoneum—one of the marks of the os internum—corresponds to the lower border of the placenta in their case, while in my own it is some distance below it; and the fact that there was hæmorrhage in the first stage, shows that it was a case of marginal placenta prævia, the placenta being situated over what of recent years has been described as the lower uterine segment. Measuring the length of the anterior wall of the cervix in the micro-photograph of their section from the point where the cervical glands begin, a point 2 ins. below the edge of the placenta, we find it to be 18 ins., and as the enlargement is eight and a half times, this makes the cervix 2·2 ins. long anteriorly. In my case the cervix measures 12 ins. in the micro-photograph, which, divided by 7, gives 1·7 ins. The difference between the length of the cervix anteriorly in their case and mine *is only* ·5 *in.* Corresponding to this greater length of cervix in their case is a greater thinness. The thickness of tissue in their case is from one-half to two-thirds that of mine, though the enlargement is greater, as 8½ to 7.

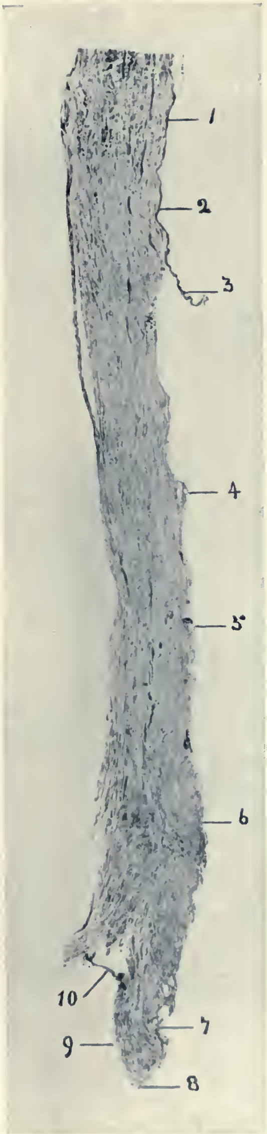

Fig. 1.

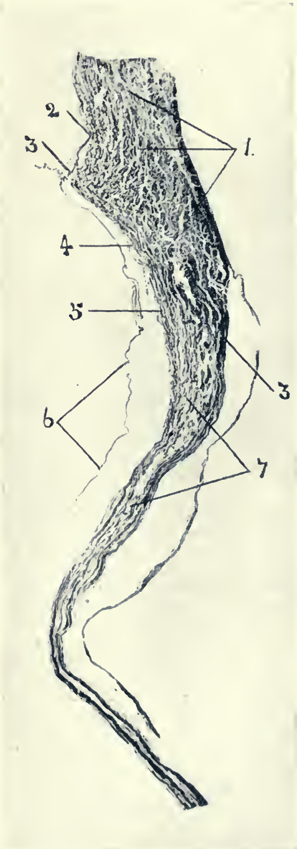

Fig. 2.

PLATE III.

[*Face page* 164.

The comparison of the micro-photographs of the posterior wall is still more instructive; and I agree with Bumm and Blumreich that the question can be settled more definitely by reference to the posterior wall, because the absence of the placenta allows the retraction-ring to be well developed, and the anatomical landmarks are more definite. That we may be able to compare the two, I place side by side a reproduction of the micro-photographs of the two sections, reducing them to the same scale—twice the size of the preparation (see Plate III.). Bumm and Blumreich maintain that the adherent membranes, described in my section as above the os internum, were an artificial product, and they give a microscopic section to show how the condition of growing membranes may be simulated, by stuck-on membranes. To show that the membranes in my section were not "stuck on," I give enlarged photographs taken from the places marked in the micro-photographs (see Plate IV.). I have gone over my microscopic sections, and had fresh micro-photographs taken from the actual sections to clear up the point in dispute. From these it is evident that the wall was here covered with decidua and chorion, and that the decidual tissue is not applied to, but growing from, the underlying muscular wall.

It is noteworthy, as explaining the greater length of cervix (3·7 ins. in theirs as against 1·3 ins. in my section), that the thickness of the cervical tissue in their specimen varies in its lower two-thirds from 0·8 in. to not more than 0·4 in.; or, allowing for the tenfold enlargement, the tissue can only be 0·04-0·08 in. in thickness. In my micro-photograph, on the other hand, the thickness of the cervical tissue averages 1·2 ins. throughout (except at the tip of the cervix), which, divided by 7, gives ·17 in. That is to say, the posterior wall of the cervix is three times as thick in my specimen as in theirs. May not the explanation of the greater length of cervix in their case be found in its greater thinness? We have here almost the "gold-leaf cervix" of Bandl—a cervix only 0·04 in. thick at one point.

As explaining their position, let me further quote from the text of the Atlas dealing with the significance of the findings:—"As we found the distinct characteristics of cervical mucosa in every part of the stretched zone, we were obliged to conclude that the whole of the stretched part of the wall of the genital tract in the preparations described, from the os internum up to the retraction-ring—that is, to the lower margin of the placenta—belonged to the cervix; and there was nothing anywhere to indicate that it was made up in part by a portion of the body, in the form of a lower uterine segment.

"There has been no functional division here of the musculature of the uterus—that is, in the sense that, at the onset of labour only, the upper portion of the body pulled itself (actively) together, while the muscular wall of the lower segment became stretched and flaccid. In our opinion there is never any such functional division, but rather a contraction of the muscles of the whole uterus—in the cervix, lower segment, and fundus alike."

After explaining what "retraction" implies, they state that—"There is, however, also an opposite kind of displacement in which the fibres are pulled out, and there is a stretching and thinning of the wall. We call this kind of displacement, 'distraction.'

"Differences in the arrangement of the muscular fibres in the body and cervix, account for the different kinds of muscular displacement brought about by contraction, and lead to an intertwining of the fibres in the body, and to a pulling apart of those in the cervix. The greater part of the muscular work of the uterus during labour is spent in the retractile and distractile displacements of the fibres, the thickening of the walls of the body, and the stretching of those of the cervix."

This suggests the following criticism. While in their specimen a retraction-ring is seen about ½-in. above where

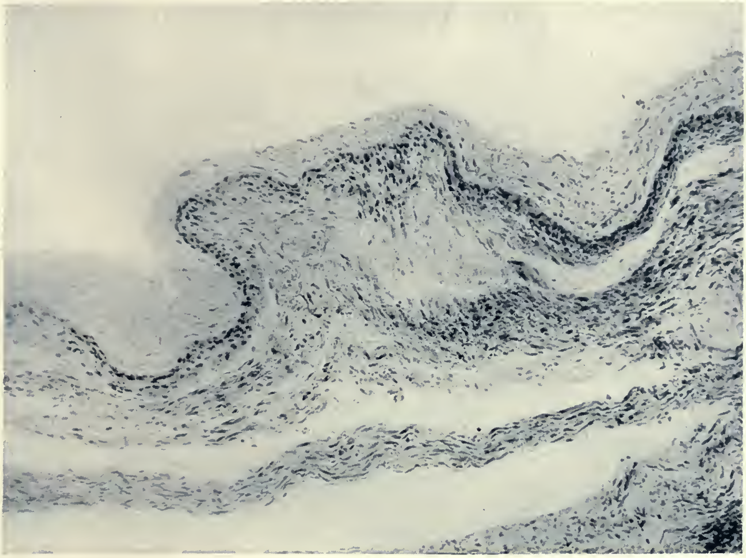

FIG. 1.

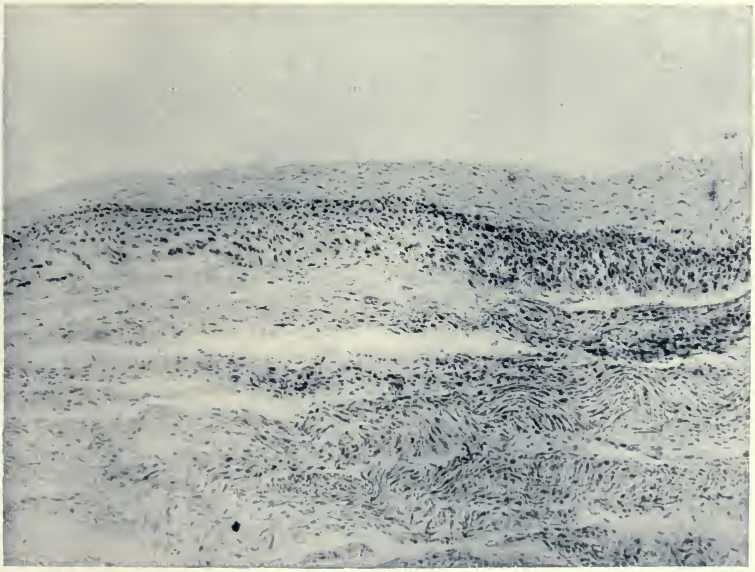

FIG. 2.

PLATE IV.

cervical mucosa begins, the evidence is just as conclusive that in my specimen the retraction-ring was from 1½ to 1¾ ins. above a similar point. Further, does this "distraction," by which, I suppose, is meant the separation of its muscular layers as the cervix is dilated, not affect the lower pole of the uterus as well as the cervical canal? The os internum, along with the part immediately above it, undergoes physical changes analogous to those of the cervix, and which the rest of the uterine wall has not to undergo to allow the uterine contents to escape.

Looking now at the membranes in the posterior wall (see Plate III.), their section shows what they describe as "losgelöste Eihäute." Is one justified in speaking of the membranes as "losgelöst," when the assumption is that they have never been attached? The area from which these membranes have come is covered with "typische Cervixdrüsen." And, as far as I understand their position, it is this, that cervix remains cervix to the end of pregnancy; that there can be no union of membranes to an area covered with cervical mucosa; and that this point of view is confirmed by the section they give of a pregnant uterus from the ninth month, before labour has set in, in which the membranes are separated from the surface of the cervix by a layer of mucus. My section, on the other hand, shows a raw surface without cervical glands, from which the membranes have been detached. This raw surface is produced by torn-through decidua.

It is also interesting to note that Bumm and Blumreich had difficulty in saying whether the glands which they label "cervical glands" were cervical glands. I quote from the text of their Atlas.

"The sections of glands from the 2 cm. broad zone immediately below the retraction swelling were, however, found to be quite different in appearance. Here it is a case of round, or long, but never acinous-shaped interstitial spaces, which, while also having a cylindrical epithelium with basal nuclei in the narrower parts, possess a cubical epithelium in the walls of the larger spaces (Plate VII., Fig. 5). *We had then to ask ourselves whether we had not perhaps after all in these structures glands belonging to the body.* What led to a decision was the preparation of a pregnant uterus from a woman who died from hæmoptysis about five weeks before her expected confinement without pains having been felt. When the hardened preparation was cut through sagittally, it was seen that the upper part of the cervix had dilated into a funnel-shaped structure; the length of the part of the cervix which had not dilated amounted to 2·6 cm., while the ditated part measured 17 mm. in front and 13 mm. behind. An exact reproduction of the conditions of this funnel-shaped dilatation is given in Plate VII., Fig. 1. This represents a section through the anterior wall, which shows that the membranes are attached firmly to their decidual lining as far as the edge of the funnel, but are, on the other hand, separated from the mucous lining of the funnel by a layer of mucus. The whole of the mucosa in the funnel is covered with a superficial epithelium which is absolutely intact, and which extends even for some distance beyond the funnel on to the under side of the membranes stretched over the funnel."

It is interesting, after reading in the paper that reference to the uterus in pregnancy is out of court, and that the matter must be settled by an appeal to the frozen section of the *second* stage alone, to find a reference to a uterus at the ninth month of gestation to clear up the question of the nature of the glands. And are such changes in the glands not inconsistent with the thesis, "cervix bleibt cervix?"

I do not wish to call in question their anatomical data. I think that it simply confirms the thesis that the explanation of the different conditions found in their preparation and in mine lies in two factors—(1) that there was a difference in the condition of the upper part of the cervical canal before labour set in; and (2) that, though there was apparently no obstruction to the progress of the head, for some reason (perhaps because the patient was an elderly primipara) the posterior wall of the cervix became three times as thin in their case as in mine, associated with which thinning there was a corresponding increase in length. To put my position in a nutshell: if you have before labour a cervix such as was found in Waldeyer's section, then you will have in the second stage a cervix such as was found in my case; if, on the other hand, you have a cervix such as they describe, and which has been described by others as present during the last weeks of pregnancy (however it be produced), then you may have in labour—provided the cervix becomes unusually thin—a cervical canal such as is found in their section.

The length of the cervix in the second stage is conditioned by the anatomical relations before labour begins, just as much as by the amount of resistance during it. And a retraction-ring may develop at some distance above the cervical canal, as my section shows.

It may be said that by assuming a different state of affairs before labour begins in the two preparations one is only shifting the difficulty a stage further back. Precisely so. And that is why I do not think that in studying the question of the lower segment we can disregard all the work there has been on the cervix during pregnancy. The result of that work has been to show that in different specimens different conditions are found. As to what is the normal, we are not in a position to state. And to ask what is normal is futile. All we can ask is, What is the condition that most frequently obtains?

The weakest position in Bumm's paper is when he states, "One of us must be wrong." It recalls the discussion as to how the placenta presented—Schultze holding that it was by its centre, Duncan that it was by its edge. Further inquiry showed that both were right, the presentation being determined by the position of the placenta in the uterus.

In conclusion let me say that we must revise our ideas with regard to the lower uterine segment to this extent. (1) The firm attachment of the peritoneum can no longer be taken as defining its upper limit: abdominal section for hysterectomy shows that the loose attachment of the peritoneum extends much higher up than was held twenty years ago. (2) The lower uterine segment may be defined as that part of the uterus which must be converted into a canal so as to allow the fœtus to pass. It corresponds to rather less than a fourth of the total cavity of the uterus. (3) This part of the uterus, by pressure of the contents, has its muscular bundles opened up so that it contracts less efficiently when labour sets in. Whether the retraction-ring forms at the os internum, as it may do in some cases, or higher up, will depend on the contractile efficiency of the musculature. (4) There must always be a raw surface in the uterus corresponding to the area from which membranes are detached in the formation of the bag of membranes. It is of course possible that the bag of membranes may be formed by the chorion splitting and a hernial protrusion formed of the amnion alone, but if the chorion enters into the formation of the bag, then the decidua must also; and this means a stripping of decidua off the uterine wall. I should be more disposed to define the lower uterine segment in terms of the possibility of the uterine muscle being less efficient in this area and the fact that the membranes are stripped off this area, than in terms of any anatomical characteristics. The retraction-ring is where the retracted area ceases.

Further, no discussion of the lower uterine segment is valid which does not take into account all the facts which have been brought forward as the result of twenty years' work on this subject. And, to return to the illustration with which we began, the death certificate is not in order, and the funeral must be postponed, for there is more life in the lower uterine segment than Bumm and Blumreich admit.

## IV.

### *Note on Zangemeister's Section.*

This is the third frozen section from rupture of the uterus with the fœtus *in situ* which has been published, the others being by v. Mars and Zweifel,[1] and it is the most instructive of the three. In v. Mars's section more than half of the trunk and lower extremities are in the peritoneal cavity, and the empty uterus lies to one side. In Zweifel's section the child's head was born, and there is uncertainty as to whether the rupture was ante- or post-mortem. In Zangemeister's case, on the other hand, only a small area of the fœtal head lay exposed in the peritoneal cavity. The section has this further value—that, by making use of a coronal section, the lateral relations of the uterus, which are of special interest here, have been exposed.

The patient, aged 29, was a primipara. After the onset of pains she continued at her work till 10 A.M., when she called in a midwife. At 6 P.M. the membranes ruptured, the os being the size of a two-shilling piece. At 5 A.M. next day she sent for a doctor, who found a transverse presentation, the right shoulder deep in the pelvis, and the fœtal heart in the middle line. Failing to turn, he called in, at 1.30, another physician, who found the child dead, the lower segment thinned, and the contraction-ring standing high and sharply defined. After further efforts at turning, decapitation was tried, without success. The patient was therefore sent to the Königsberg Maternity at 6 P.M., which meant a journey by road and rail, and she died half an hour before her arrival there at midnight. Two days elapsed before permission was obtained for a post-mortem, which showed a small amount of blood-stained serum

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[1] A case by Pinard and Varnier died from rupture of the uterus *after* the expulsion of the fœtus.

in the peritoneal cavity; the fundus 10·4 ins. above the pubes; and on the posterior aspect of the uterus, to the right side, an oval rent 5 ins. in diameter, running obliquely upwards and towards the middle line. From the rent protruded a segment of the fœtal head to the extent of about half a hen's egg. The lower corner of the rent was 4 ins. (10 cm.) above the deepest part of the pouch of Douglas, while its upper lateral end was 5·6 ins. (14 cm.) below the fundus. The greater part of the head lay underneath the peritoneum in the right iliac fossa. Above the head and immediately above the rent the retraction-ring could be distinctly seen and felt. As the whole body could not be obtained, the pelvis, with the part of the spinal column above it, was removed with the contents.

The Atlas contains four plates—(1) The coronal section; (2) same showing whole fœtus; (3) posterior and (4) anterior views of genital tract with fœtus removed. The section passes through the acetabula and the anterior portion of the rent. As regards its relation to the genital tract, more and more of the latter lies behind it as it passes downwards. The child is rather short of full-time—thirty-five weeks; the placenta, which was on the fundus, is separated throughout, but there is no hæmorrhage between it and the uterine wall. The pelvis is generally contracted, but only to a slight degree, the conjugata vera measuring 4 ins., and the transverse 5 ins.

He adopts Aschoff's thesis, that the contracted part of the canal produced by the muscular wall, the os internum anatomicum, does not coincide with the boundary between the mucosa of body and cervix. The retraction-ring forms from the musculature situated at the former point. Post-mortem change prevented conclusions being formed as to the mucosa.

There are two longitudinal tears—a small one on the left and a larger one on the right side. The latter begins in the vagina, the walls of which are here 3 mm. thick, extends upwards through the cervix so as to expose the parametric tissue through a rent, the margins of which are 3·6 ins. apart. As it passes further upwards, it comes to be more posterior, so that finally it goes through the peritoneum behind the insertion of the broad ligament, stopping short at the retraction-ring.

As the term "retraction" is applied to the behaviour of the individual fibres, he suggests that "concentric adaptation" would be a better term to apply to the behaviour of the uterine wall as a whole, *i.e.*, "the plastic adaptation of the uterus to the form of its contents." As the outer muscular layers are fixed the inner retract more, which implies a sliding of the internal upon the external layer. This leads to a concentric diminution of the whole muscle—not an eccentric contraction of the wall towards the fundus.

Nor does the position of the retraction-ring in the uterine wall change. The upward movement of the retraction-ring, which we note clinically, is explained by the fact that the fundus uteri cannot descend as the result of the expulsion of its contents in cases of obstructed labour. A rent may be circular or axial, the latter being due to expansion of the canal by its contents—in this case by the head and breech being forced within the canal already thinned by traction. The introduction of the hand and attempts at turning and decapitation also played their parts. The concentric pulling together of the retraction-ring, slipping back over the fœtus, leads to a relative expansion of the tract below—a point which has not received sufficient attention.

The fact that there was little blood in the peritoneal cavity seems to show that the rupture was incomplete at first. And the absence of retro-placental hæmorrhage shows that the separation of the placenta—which would not occur until the fundus had been fully retracted—did not take place till the circulation was feeble. Upon these facts the conclusion is based that the prolonged labour and the attempts at turning produced incomplete rupture, the tear into the peritoneal cavity being a later occurrence during the transportation of the patient.

The chief point of interest in this section is the light it throws on the difference between complete and incomplete rupture. While the peritoneal relations are not exactly indicated in this section, the reflection of the peritoneum seems to be high up above the level of the brim at either side—it corresponds, in fact, to a section I described from the first stage of labour—and it is interesting to note that at the sides we have an extensive incomplete tear; that is to say, the peritoneal cavity is not opened into. It is only when the tear has extended towards the posterior aspect of the uterus that the peritoneum has given way. The section therefore illustrates the point I drew attention to in describing the lateral relations of the peritoneum and the light which these might throw on the difference between complete and incomplete rupture.[1]

As to whether the rent involved the cervix only, or extended into the body of the uterus, we have no conclusive evidence. Zangemeister evidently inclines to the view that the thinned area which tore was cervical only—at least as far as its muscular wall is concerned. This is borne out by the statement that the retraction-ring represents the os internum of the old anatomists.

His distinction between axial and circular tears is interesting, and the explanation of the production of the former in this case we quite endorse. The evidence, however, as to its not becoming a complete tear until after the circulation had practically ceased is not conclusive, because hæmorrhage at the placental site is not a necessary consequence of separation of the placenta in normal labour.

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[1] *Edinburgh Obstetrical Transactions*, vol. xii., 1886-7, p. 46.

### *Résumé.*

1. A review of the literature shows that several pregnant uteri have been described in which the "decidual reaction" extends below the os internum. While some find in these specimens the indication of transitional physiological changes through which the uterus in pregnancy always passes, the weight of evidence is in favour of their being aberrant types.

2. Bumm and Blumreich found in a frozen section from the second stage a cervical canal measuring 2·2 ins. in front, and from 3½ to 4½ ins. behind; also a retraction-ring posteriorly immediately above cervical mucosa. Hence they inferred that the cervical canal in the Author's section must be as long posteriorly, that the retraction-ring was there also at the os internum, and that the membranes described as partly growing, partly separated, were artificially stuck on.

3. Proof has been given—(1) that there is a decidual-lined area below the retraction-ring in the Author's section; (2) that a shorter length of the cervix agrees with a greater thickness; (3) that *in this case* the retraction-ring is some distance above the os internum; (4) that therefore there is here a lower uterine segment which is not stretched cervix but part of the wall of the body of the uterus.

4. The thinness of the cervix posteriorly in Bumm and Blumreich's section is abnormal; and the epithelium of the glands in the upper part of the so-called cervical mucosa is not that of normal cervical glands.

5. Zangemeister's section shows that in rupture of the uterus the tear is incomplete so long as it is lateral, but becomes complete when it extends to a part where the uterus is covered with peritoneum.

Discussion as to what is normal is futile. What has to be ascertained is, what is most frequent. Generalisations from one specimen are inadequate.

## Literature.

*N.B.*—This is not a complete list of the Papers on the Lower Segment, but simply those which either mark an epoch or are referred to in the text by the corresponding number.

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5. D. Chiara.—"La Evoluzione Spontanea sorpresa in atto mediante la congelazione," Milano, *Tipografia dei Fratelli Rechiedei,* 1878.
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8. H. Bayer.—"Morphologie der Gebärmutter. Der Cervix u. seine Stricturen," Freund's *Gynäkologische Klinik,* Strassburg, Trübner, 1885.
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35. G. Leopold.—*Geburtshülflich-anatomischer Atlas,* 30, *Tafeln enthaltend, zu Uterus und Kind, etc.,* Leipzig, S. Hirzel, 1897.

37. Lusk.—"Remarks on a Frozen Section," etc., *Brit. Med. Journ.,* 1898, vol. i., p. 1506.

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41. Zangemeister.—*Frontaler Gefrierdurchschnitt durch die Beckenorgane einer an Ruptura Uteri bei verschleppter Querlage verstorbenen Kreissenden,* Leipzig, Vogel, 1907.

The Author's contributions are the following:—

7. "The Anatomy and Relations of the Uterus during the Third Stage of Labour and the First Days of the Puerperium," *Edin. Med. Journ.,* September and October 1884.

14. "Sectional Anatomy of Labour," *Edin. Med. Journ.,* October November, and December 1887.

17. "Note on Saexinger's and Winter's Sections," *Edin. Obstetrical Transactions,* 1888-9.

18. *Atlas of the Anatomy of Labour as exhibited in Frozen Sections,* W. & A. K. Johnston, Edinburgh and London, 1889, Third Edition, 1896.

19. *Handbook of the Anatomy of Labour as Studied in Frozen Sections, and its bearing on Clinical Work,* W. & A. K. Johnston, Edinburgh and London, 1889, Second Edition, 1899.
20. "On the Light which Sectional Anatomy will throw on the Mechanism of Labour," *Edin. Med. Journ.*, July 1889.
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23. "Some Recent Results from the Study of Labour by means of Frozen Sections and Casts," *Brit. Med. Journ.*, 1st and 8th November 1890.
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33 "Braune's Os Internum and the Retraction-Ring," *Edin. Obstetrical Transactions,* February 1896.
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## DESCRIPTION OF PLATES.

### PLATE I.

Genital Tract from Author's Case that died towards the end of the Second Stage[1] (⅓) :—

*m*, Membranes, attached down to wavy line *x*, but separated below; *p*, placenta; *rr*, retraction-ring; *sp*, sacral promontory; *uvp*, utero-vesical peritoneum; *ppd*, pouch of Douglas; *nf*, ridge corresponding to neck of child; *oi*, os internum and *oe*, os externum, cervix being shaded;

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[1] From the Author's *Atlas of the Anatomy of Labour*, 3rd edition, Plate XXIII. (reduced to one-third).

*b*, limit of bladder behind pubes; *u*, urethra; *av*, *pv*, anterior and posterior vaginal walls; *r*, rectum; *a*, stretched anus; *v*, vulva; *pb*, peritoneum stretched.

The cervical canal measures 1·7 ins. anteriorly, and 1·3 ins. posteriorly; the membranes are still attached below the retraction-ring (see Plate IV.), but separated lower down (see Plate III., Fig. 1).

### PLATE II.

Genital Tract from Bumm and Blumreich's Case that died in the Second Stage.

The placenta is on the anterior wall, and comes down to the os internum.

The cervical canal measures 2·2 ins. in front.

The uterus shows a thinner (less retracted) wall at the fundus and posteriorly than in Plate I.; and the retraction-ring is less developed. The distance between it and the posterior lip of the cervix is 5 ins.; and over the greater part of this area are cervical glands—*cf.* Plate III., Fig. 2—and free membranes.

### PLATE III.

#### *Fig.* 1.

Reproduction of micro-photograph[1] of posterior wall of lower uterine segment and cervix, beginning 1·25 cm. below retraction-ring, and extending to the os externum (reduced $\frac{2}{7}$, *i.e.*, twice the size of preparation), taken from section in Plate I.:—

1. and 2. Membranes (decidua and chorion), unseparated.
3. Membranes detached and unfolded.
4. Decidua.
5. 6, and 7. Cervical glands.
8. Os externum.
9. Vaginal epithelium.
10. Posterior fornix.

*N.B.*—The os internum lies between 4 and 5.

#### *Fig.* 2.

Reproduction of micro-photograph of posterior wall of cervix from Bumm and Blumreich's section, including retraction-ring and upper *half* of stretched cervix (reduced $\frac{2}{10}$, so as to bring it to same scale as Fig. 1, *i.e.*, twice the size of preparation):—

1. Retracted musculature of the body.
2. Firm attachment of the membranes.

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[1] From the Author's *Atlas*, 3rd edition, Plate XXIV.

3. Boundary line between musculature of body and cervix.
4. Beginning of cervical glands.
5. From here downwards, typical cervical glands.
6. Detached membranes (amnion and chorion).
7. Stretched cervical musculature.

### Plate IV.

*Fig.* 1.

Micro-photograph of membranes from immediately above the point of their separation (between 2 and 3 in Plate III., Fig. 1). Showing decidua and chorion, decidua evidently growing from the uterine wall and not stuck on by pressure.

*Fig.* 2.

Section taken higher up (from 2), showing chorion and decidua, the latter growing *in situ.*

*Sir Halliday Croom* said that anyone listening to the paper they had just heard must be struck by two things, the lucidity of the argument and the accuracy of the deductions. The paper was most able and interesting, and he thanked Dr Barbour most cordially.

*Dr Fothergill* thought it ridiculous for anyone to make such statements as that there were no decidual changes in the cervix during pregnancy. He had cases which showed such changes quite clearly. It was a mistake to make positive statements on such subjects. The question was not anatomical but physiological. He suggested the study of the extrusion of fibroids as an aid to the elucidation of the subject. He did not understand why Dr Barbour should take so much notice of German criticism, which, in his opinion, should often be ignored.

*The President* returned thanks for a very able paper, and suggested that the thickening of the uterine wall at the retraction-ring might be due to the absence of fœtal pressure there.

## MEETING VI.—MAY 13, 1908.

Professor STEPHENSON, *President, in the Chair.*

I. *The President,* before commencing the ordinary business of the meeting, made allusion to the death, which had occurred since the previous meeting, of Dr Charles E. Underhill, President of the Royal College of Physicians of Edinburgh, formerly a President of the Society. He spoke of the high esteem and regard in which Dr Underhill had always been held by his professional brethren, and of how amongst the large circle of his patients he was universally looked to as the "beloved physician." Perhaps he would not be remembered so much for the importance of his contributions to the scientific knowledge of his subject—although interesting and suggestive papers had come from his pen—as for his high standard of conduct and his high aim and attainment in professional work. They mourned that evening the loss of a distinguished Fellow of the Society, but, even more, of an admired and esteemed friend.

*Dr J. W. Ballantyne* asked leave to associate himself with the remarks of the President, which he felt sure expressed the sentiments of all who were present.

*Dr Haultain* suggested that a letter be sent to Mrs Underhill, expressing the sympathy and condolence of the Fellows of the Society.

II. *Dr Fordyce* showed—(*a*) A LARGE INTERSTITIAL FIBROID OF THE UTERUS. There was no hæmorrhage at all, and little complaint except difficulty in passing water. There was little to indicate the tumour.

(*b*) FIBROMA UTERI OCCURRING EIGHT YEARS AFTER THE MENOPAUSE. The reason for removal was the occurrence of three very severe floodings. On examination by the vagina the tumour was felt, and there was much vaginal swelling and great tenderness. The cervix could not be felt. The operation was very difficult owing to the great fatness of the patient. The cause of the hæmorrhage was discovered to be a soft, pulpy, mucoid mass high up in the fundus, from which blood was streaming. Examined microscopically, the tumour was reported to be a simple adenoma.

(*c*) NECROBIOTIC FIBROMA UTERI. The patient had had a full-time child exactly three months before the removal of the tumour.

*Dr Haultain* thought that the second case was wrongly stated. The bleeding had evidently been caused by the mucous polypi. He mentioned this because writers on fibrous tumours after the menopause would be glad to lay fingers on this case; but, in his opinion, the fibroid had nothing to do with the bleeding.

III. *Dr Lamond Lackie* showed—(*a*) CANCER OF THE CERVIX REMOVED BY THE ABDOMINAL ROUTE. The patient was a nullipara aged 30, and, three months before, had a hæmorrhage, after which every month there had been much hæmorrhage and an offensive vaginal discharge. The diagnosis was spreading cancer of the cervix of great extent. Within a month of the first symptoms the entire cervix was eaten away. The abdomen was opened and the cancer removed. No glands were palpable. The patient recovered well, but fears of a recurrence were entertained. The microscopical report was encephaloid cancer.

(*b*) DEGENERATING FIBROID. The patient had had two children without trouble. Within the last few months the tumour had grown into the abdomen, becoming more and more cystic. Twelve days ago the abdomen was opened. The tumour was difficult to remove on account of the many adhesions. It was hard and solid, like a fœtal head; had no connection with the uterus and no pedicle. The patient, aged 63, had done well. Microscopical report, necrotic fibroma.

(*c*) BILATERAL OVARIAN DERMOIDS. The patient had had eight children, the last in December 1906, after which she had not been well. In July 1907 a mass appeared in the pelvis. Douching and plugging had been tried, but, in September, symptoms of severe abdominal pain and peritonitis manifested themselves. The abdomen was opened and two dermoids were removed from the base of the abdominal cavity.

*Dr Haig Ferguson*, with regard to the rapid growth of cancer, mentioned a case where a patient had been dismissed from the Maternity Hospital, and within six weeks had been admitted to the Infirmary with carcinoma so advanced as to be hopeless. Palliative treatment only could be adopted.

IV. *Dr Haultain* showed UTERUS AND OVARIES FROM A WOMAN OF 21 WHO HAD NEVER MENSTRUATED. The patient complained of very severe pelvic pain, much aggravated at the menstrual periods. By bimanual examination a diffuse swelling was felt to fill the pelvis. The sound passed 1 in. On opening the abdomen, the matting of the intestines to one another and to the parietes entirely obliterated the peritoneal cavity, and the enucleation of the uterus and ovaries proved extremely difficult. The uterus was much atrophied and the cavity of the body obliterated. It measured little more than 1¾ ins. altogether, while the ovaries were enlarged to the size of a hen's egg, and were the seat of numerous blood cysts. The inflammatory adhesions were to be accounted for by a history of tubercular peritonitis. This was the third occasion on which he had removed hæmorrhagic cystic ovaries associated with absolute amenorrhœa.

# V. CASE OF ANGULAR PREGNANCY WHICH VERY CLOSELY RESEMBLED AN ECTOPIC GESTATION.

By J. M. Munro Kerr, M.B., etc., Physician for Diseases of Women, Western Infirmary; Obstetric Physician, Glasgow Maternity Hospital.

The case which I am about to describe is an example of a somewhat rare form of uterine pregnancy in which the ovum is implanted over the uterine ostium of the Fallopian tube, and simulates an extra-uterine pregnancy. Wassilieff has applied the name, "angular pregnancy" to the condition.

The following is the history of the case:—

Some two years ago, I was asked by a medical friend to visit his wife, who, he thought, was suffering from a threatened miscarriage. I had previously attended her at two full-time confinements. Both the labours were quite normal, but she had peculiar nervous disturbances in both puerperia. These nervous phenomena were quite independent of any sepsis. When I saw her she was complaining of some abdominal uneasiness and fairly considerable hæmorrhagic vaginal discharge. She informed me that she had missed a period, and that she thought she must be about six weeks pregnant. I made a bimanual examination and discovered the uterus in normal position, slightly enlarged, and with a small swelling in the neighbourhood of the left Fallopian tube close by the uterus. I informed her husband that I was afraid the condition was one of extra-uterine pregnancy, but that I was not quite prepared to definitely say so, only I thought one must take the precaution of being ready to operate should any unfavourable symptoms arise. It appeared as if my suspicions of extra-uterine pregnancy were correct, for two days later a cast complete, all except a small portion of one corner, was expelled from the vagina. My friend still pressed me to delay operation, which I did, and two days later the remainder of the cast came away with the ovum attached. The swelling in the left corner of the uterus then disappeared. As some bleeding persisted, I curetted the uterus a few days later. The lady made a very satisfactory recovery.

It is apparent from the history of this case that all the cardinal symptoms of extra-uterine pregnancy were present, abdominal uneasiness, hæmorrhagic vaginal discharge, menstrual period missed, swelling of one tube. Upon one or two occasions the abdomen has actually been opened for this condition. Kelly and Wassilieff record such cases, and all writers, including Budin and Bar, refer to the difficulties of diagnosis. Naturally, the interstitial variety of extra-uterine pregnancy is the one which most closely resembles "angular" pregnancy.

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*Dr Haultain* said he was much interested in this case. He did not, however, agree with the use of the term "angular uterine pregnancy." From the clinical symptoms the case appeared to be one of extra-uterine pregnancy of the interstitial variety bulging into the uterine cavity. This was a rare condition, but recognised. It was more likely to be the interstitial variety developed towards the uterine cavity. He was not inclined to accept the term "grown into" the uterine cavity.

*Dr Munro Kerr*, in reply to Dr Haultain, said that he thought the term "angular" must now be accepted, in connection with such a peculiar condition. The very character of this case proved it. He thought that the description of the cast, into the torn portion of which the second piece fitted, was sufficient proof. He could not believe that this would have occurred if the ovum had been in the tube.

*The President* thought there was little difference between "interstitial" and "angular." The interstitial was a variety of ectopic gestation, and the ovum had been known to develop and make its way into the uterine cavity. He saw no reason for regarding this case as anything but truly ectopic, and agreed with Dr Haultain as to the term "angular." It was a rare extra-uterine gestation, but there was no need to introduce the word "angular." He thought that if the "angular" variety developed as suggested, it must be of comparatively common occurrence, and this case could not then be regarded as unusual; but until it was proved to be uncommon, he could not see the need of introducing the term "angular."

*Dr Munro Kerr* said he must lodge a protest with regard to the President's remarks. The situation had a distinct bearing on this case. Could a possible ovum planted there cause a pregnancy as described? They might call it what they liked; he merely wanted to bring forward this case where the ovum was planted in the angle. In future it might be possible to distinguish such a condition from the ordinary "ectopic."

*Mr Scott Carmichael* remarked that he had recently read an article in a French medical journal, in which it was stated that there were two distinct signs for this peculiar gestation. (1) Hegar's sign of pregnancy does not appear in "angular" gestation until the third or fourth month. (2) The swelling, in ectopic gestation, is dense and elastic, in the "angular" variety it is very soft.

*Dr Haig Ferguson* was inclined to agree as to the importance of the two points brought forward by Mr Carmichael. Especially was this so as regards the tenderness. If there was no tenderness there should be no operation, but if tenderness was marked, there should be an operation. He thought this was the first case of the kind recorded before this Society and that it was one of some importance.

# VI. RUPTURE OF THE UTERUS AND ITS TREATMENT, BASED ON A SERIES OF FOURTEEN CASES.

By J. M. Munro Kerr, Physician for Diseases of Women, Western Infirmary; Obstetric Physician, Glasgow Maternity Hospital.

To anyone acquainted, however slightly, with obstetrics, the mention of rupture of the uterus at once suggests a labour badly managed. Such a view is in the main correct, for, without doubt, in the majority of instances, the accident must be considered a disgrace to the obstetric art and to the individual who has charge of the parturient. There are, however, exceptions, cases in which the accident is quite unavoidable, even cases where it occurs during pregnancy.

Although well aware that the manner in which I am going to consider rupture of the uterus is not the most scientific that could have been adopted, it appears the most practical, and has certainly helped me, personally, to a better understanding of the accident. I purpose considering rupture at three distinct periods—(*a*) During pregnancy; (*b*) Early in labour; (*c*) After labour has been protracted.

## *Rupture of the Uterus during Pregnancy.*

Of cases belonging to this group the most numerous are those in which the uterus has been previously injured. Naturally, the injury which first occurs to one's mind is a previous Cæsarean section wound. There are quite a number of cases in which such a wound has given way. I have myself described one (*Jour. Obst. and Gyn. Brit. Empire*, vol. vi., 1904, p. 378) in which the cicatrix of a fundal incision gave way; and similar cases have been recorded by Ekstein (*Zentralb. f. Gynäk.*, 1904, p. 1302) and Meyer (*Zentralb. f. Gynäk.*, 1903, p. 1416), while cases of rupture through the scar of the ordinary longitudinal incision have been reported by Targett, Galabin, Guillaume, Woyer, Koblanck, Everke, and quite recently by Couvelaire (*Ann. de Gynéc.* 1906, p. 148), who gives a review of several of the recorded cases.

But other injuries, such as perforation of the uterus with a curette or uterine sound, etc., have been followed by rupture at a subsequent pregnancy, as in the cases of Herzfeld (*Centralb. f. Gynäk.*, 1901, p. 1219) and Staude (*Zentralb. f. Gynäk.*, 1903, p. 706).

In this connection the observations of Jellinghaus (*Archiv. f. Gynäk.*, Bd. liv.), that previous removal of an adherent placenta predisposes to rupture, are of particular interest. The probability is that in such cases the operator actually tears the uterus with his fingers in removing the afterbirth, and, blood being effused, the wound heals by granulation.

Very similar to the above are those in which a previous rupture gives way. Several cases of this nature are referred to by Peham (*Centralb. f. Gynäk.*, 1902, p. 87). Lastly, there is a group in which injuries, falls, blows, etc., during pregnancy have been the cause. Reusing (*Centralb. f. Gynäk.*, 1895, p. 41) describes a case of his own and several others previously recorded. In most of them the women were multiparæ, but in Reusing's and Plenio's cases they were young primiparæ. The injury to the uterus was sometimes direct, but at others it was indirect, the women having fallen upon their sides or buttocks. In such cases the laceration is generally in the upper part of the uterus.

As is well known, it occasionally happens that the interstitial portion of the tube becomes gravid and ruptures, as a rule about the sixteenth week. Such cases, literally speaking, are examples of uterine ruptures, but they are usually considered in connection with ectopic pregnancy. The same applies also to pregnancy in a rudimentary horn of a double uterus.

The cases of rupture of an infantile uterus in which pregnancy occurs are somewhat different, however. Such an occurrence is very rare, for the women are almost invariably sterile. There have been, however, in recent years one or two cases described. The two most interesting are those of Freund (*Hegar's Beiträge*, Bd. iv., 1) and Schickele (*Hegar's Beiträge*, Bd. viii., 337, 1904). These and similar cases are noteworthy. Wertheim (Winckel's *Handbuch*, Bd. ii., Teil 1, p. 408) considered his case one of pregnancy in an infantile uterus, but Schickele looked upon his as possibly a pregnancy in a diverticulum. Similar are the cases, such as Donald's, where a double uterus gives way (*Practitioner*, June 1903).

But putting aside all such cases, which are, after all, easily explained, and also those such as Martin's (*Trans. Edin. Obst. Socy.*, vol. xxi., p. 63), where a hydatidiform mole perforated the uterine wall, there yet remains a number in which the cause of rupture is still unknown. Round such cases there is much interesting speculation. As, however, the subject belongs still only to the region of speculation, I do not intend to do more than mention some of the views which have been expressed.

Fatty degeneration has been freely spoken of in the past, but in recent years grave doubts have been expressed regarding the frequency of its occurrence; Herman (*Lond. Obst. Trans.*, vol. xliii., 1901, p. 220), Gebhard (*Pathologische Anatomie der Weiblichen Sexualorgane*, 1899, p. 239), and other modern writers are very sceptical regarding it.

Further investigations are necessary before this matter is decided. The same also applies to hyaline degeneration, although, in this connection, a case recently recorded by Meyer (*Hegar's Beiträge*, Bd. ix., 45) is of great importance and interest. He found in the neighbourhood of the tear, which had occurred during pregnancy, that the uterine tissue and muscle showed signs of hyaline degeneration. The exact effect pregnancy has on a uterus affected by chronic metritis is also unknown, although it has been mentioned repeatedly by writers as favouring the occurrence of rupture, nor is it to be wondered at that it should. Personally, I feel convinced that degeneration of the wall is frequently present and predisposes to the accident, for a slight fall or cough, or a more than usually violent movement by the child, have been the only apparent exciting causes in some cases.

The recent investigations by Pick (*Berliner Klinische Wochenschrift*, 37, 1900 p. 536), Ivanoff (*Ann. de Gynéc.*, August, September, October 1904), Schaper (*Diss. Wurtzburg*, 1901), and many others, have not confirmed the theory of Dawidoff and Poroschin (*Centralb. f. Gynäk.*, 1898, p. 183), that the rupture is due to a deficiency of elastic fibres in the tissue of the uterus in the neighbourhood of the rupture. Several, including Martin (Berlin) and Duhrssen have, however, found the elastic fibres diminish as age advances, and it is quite probable that they, in common with other tissue, become altered with each succeeding pregnancy.

The situation of the placenta has an influence in different ways. There are not a few recorded cases of rupture of the uterus associated with placenta prævia. Again, the tubal orifice being a weak spot, as Gebhard points out, implantation there is unfavourable. It is worthy of note that in a considerable number of cases of rupture during pregnancy the placenta has been situated over the tear, and it is just possible that under certain conditions the chorionic villi have a specially destructive effect and burrow unusually deeply into the wall. Be that as it may, not a few authors have referred to the fact, as, for example, Alexandroff (*Monat. f. Geb. u. Gynäk.*, Bd. xii., 1900, p. 447), Meyer, Couvelaire, and Ekstein. I also referred to it in recording my own case.

### *Rupture of the Uterus after a protracted Labour.*

It might appear a natural sequence that, having discussed rupture during pregnancy, one should turn to those cases where the accident happens early in labour. Personally, I think otherwise, however, for I am disposed to look upon the latter group from the etiological point of view as standing midway between the group where rupture occurs during pregnancy and the one in which it follows a prolonged parturition. Consequently, it will be best understood after both of these groups have been considered.

Rupture of the uterus following a complex and protracted labour is a subject which has come to be understood only in recent years. Although Guillemeau, Baudelocque and, later, Machælis appreciated in great part the nature of the accident, it is only since Bandl's writings on the "Lower Uterine Segment" that any clear conception of the pathological anatomy of the subject has arisen.

For a correct comprehension of rupture of the uterus in labour one must appreciate the different anatomical features of the uterus, and especially of the lower uterine segment, during parturition. That being so, I must consider them for a moment.

Since Bandl's paper appeared in 1875 the number of contributions to the subject of the lower uterine segment have been legion; but although many matters regarding it have from time to time been settled, there are still many details upon which differences of opinion exist, and these differences have not been lessened by the latest frozen section of Bumm and Blumreich. This is not the place to discuss these in detail, and so I have thought it best to give the principal conclusions of one of the most recent writers. Von Rosthorn, writing in Winckel's *Handbook of Midwifery*, Bd. i., Hft. 1, p. 553, comes to the following conclusions regarding the lower uterine segment.

1. There already exists during pregnancy a lower uterine segment.
2. This segment is covered by decidual altered mucous membrane.
3. The arrangement of the muscle in the wall of the seg-

ment is lamellar and it is to a moderate extent distinct from the wall of the corpus uteri, and very different from that of the part below.

4. The upper part of the lower segment is marked by the firm attachment of the peritoneum, and in the inside, when uterine contractions have already been in existence, by the so-called contraction-ring.
5. The lower limit is the essentially different cervical tissue.
6. The mucous membrane appears to vary. In the majority of cases there is a sharp differentiation, on one side distinct decidua and on the other cervical mucous membrane.

During labour the upper part, the body, is the only really active part of the uterus, the lower uterine segment and cervix playing an entirely passive rôle. As labour progresses the body becomes diminished in a vertical direction; the retraction or Bandl's ring, which marks the lower limit of the body and the upper limit of the lower segment, becomes further and further drawn up and can be sometimes appreciated by abdominal palpation, as high as, or even above the umbilicus. But the active contractions of the uterus would do more than pull up Bandl's ring, they would also pull up the cervix were it not that the latter is more or less fixed by its attachment. As a result, therefore, of the upper part being pulled up and the lower fixed, one finds, in a protracted labour, that the area between, viz., the lower uterine segment, becomes more and more stretched and thinned out. It is not surprising, therefore, that there is a stage at which, not being able to stretch any further, it gives way, either spontaneously or as a result of operative interference.

For many years after Bandl's papers were published great importance was attached to this fixation of the lower part of the uterus, more particularly by the presenting head, as in cases of contracted pelvis and hydrocephalus. Freund, at the present time, is the strongest supporter of this view, and gives emphatic expression to it in his chapter in Winckel's *Handbuch*, Bd. ii., Teil 3, 1905. But few go as far as Freund. Olshausen and Veit, in the last edition of their textbook, and Ivanoff do not attach the same importance to this factor. Personally, my experience leads me, in common with most others, to side with the authorities last mentioned.

Without doubt a good deal of misunderstanding has arisen from the erroneous idea that the cervix is drawn up or retracted over the head during labour. From clinical observation I have not found that to be the case to any great extent, and the records of frozen sections support that view. Barbour (*Anatomy of Labour*, p. 47) points this out when he says—"The dilatation of the cervix can only, to a very slight degree, result from stretching through traction on its ring by the contracting uterine walls, but must be almost entirely due to dilatation through expansion of the ring by the bag of membranes or presenting part."

What happens is that the cervix and lower part of the lower segment become unduly pressed upon, bruised, and lacerated. It is not so much that the cervix is pressed down and cannot retract over the head.

But let us now consider the conditions which chiefly favour the occurrence of rupture of the uterus—pelvic deformity, malpresentations and malpositions of the child, and hydrocephalus, and let us see how they act and the nature of the injuries they produce.

The importance of pelvic deformity as a cause of rupture of the uterus is well illustrated by the large percentage of cases in which bony deformity of the canal exists. In the fourteen cases which have been under my care in recent years pelvic deformity was present in 40 per cent.; others have had a similar experience. Merz (*Archiv f. Gynäk.*, 1894, Bd. xlv., Hft. 2, p. 181) found it in 30 per cent., and Ivanoff in 40 per cent. of their collected cases.

The pelvic deformity is not, as a rule, of the extreme type, for when the deformity is great the danger of the condition is early appreciated, and labour is not allowed to be indefinitely protracted. Almost without exception the women have borne children, and many of them have had several. Naturally, the danger increases with each succeeding pregnancy. This is often attributed to degeneration of the uterus, and rightly so in many cases; but in recent years it has come to be appreciated that in some cicatrices from previous labours have given way, cicatrices of wounds often only slight and never appreciated. The nature of the lesion in the different forms of contracted pelvis has been most carefully investigated by Ivanoff; no one has gone into this subject so particularly. Personally, however, I am not in a position to express any opinion regarding his conclusions, although I have found the lesions in cases of contracted pelvis are in general as he has described. He is the first who has so exactly distinguished the lesions which are found in flat pelvis from those which arise in generally contracted pelvis. He believes that the tears are produced by injury of the soft parts between the head and the pelvic wall. The actual rupture may occur spontaneously or be produced by forceps or version.

From these lacerations which occur in the progress of labour (transverse, commonly, in front or behind in the case of flat pelvis, and lateral in the case of generally contracted pelvis) extension of the tear readily occurs, especially if the child is forcibly extracted. In such cases, as with violent rupture in general, the extension of the laceration is often longitudinal, and is very much more extensive if it follows version than if it follows forceps delivery.

Next in order of frequency as a cause of rupture are malpresentations of the child, and especially transverse presentation. Amongst my cases such a condition existed in 17 per cent., and taking the authorities already referred to one finds that Koblanck found it in 25 per cent., Merz in 11 per cent., and Ivanoff in 32 per cent. As might be expected, the rupture in most cases results while attempting version after the waters have drained away and the shoulders have become impacted. But in a certain number of cases this has not been so, the rupture has occurred spontaneously. Spontaneous rupture in transverse presentations, however, is very rare.

In most cases the laceration is longitudinal and to one or other side. It tends to be extensive, as one would expect, and to run up into the body. The cervix is invariably torn, and the vaginal vault in many cases also suffers. In this condition there is no difficulty in understanding how the accident occurs; to my mind it is surprising that it does not occur oftener.

Other malpresentations, such as face and brow presentations, are occasionally found associated with rupture. A brow presentation is certainly a very unfavourable attitude, for the long diameter is thrown across the pelvic brim. It is dangerous, therefore, to attempt to deliver the child by forceps. Indeed, should such a course be persisted in, after one or two futile attempts, the risks of rupture are considerable.

Very much less likely to cause injury are face and occipito-posterior vertex positions; indeed, when they are associated with rupture, the cause has usually been some other co-existing condition or the treatment has been very much at fault.

The other important cause of rupture is hydrocephalus. In my cases it occurred once, 7 per cent. Merz found it in 7·5 per cent., Ivanoff in 3 per cent. In most cases of rupture produced by hydrocephalus, however, the hydrocephalus has not really been the cause. Either the condition has not been recognised, and it must not be forgotten how easy it is to overlook the condition, or the proper treatment (craniotomy) has not been practised; attempts have been made with forceps, as in my case, or some other method of delivery has been tried. As a cause of rupture in this condition Freund attaches great importance to the fixation of the cervix by the enlarged head, and he believes this occurs more frequently when the hydrocephalus is of medium dimensions, as when it is very large the head cannot engage and so the cervix slips over the head. With hydrocephalus the cervix and lower segment are burst, and but rarely does this occur spontaneously; very usually it follows the application of forceps, or traction on the lower limbs.

The lacerations are, as a rule, very extensive and longitudinal. In my case the whole lateral wall was torn longitudinally. In connection with hydrocephalus, however, it must not be forgotten that very often the uterine wall is diseased.

Other conditions, such as tumours, cicatrices and adhesions, etc., obstructing the parturient canal, may naturally predispose to and have been associated with rupture. Old cicatrices, especially about the cervix, are liable to tear, although sometimes cicatricial tissue withstands the strain and the tissues not involved formerly give way.

With tumours, at the present time, however, the accident should not occur, as it is quite inexcusable to try to drag a child past a tumour by brute force.

In a certain number of cases rupture has followed the removal of the placenta. Schwendener (*Monat. für Gynäk.*, xviii., 1903) has recorded one as a result of expelling the placenta after Credé's method. Fränkel (*Zentralb. f. Gynäk.*, 1903, p. 907) has recorded another. Oswald (*Diss. Basel*, 1902; *Ref. Zentralb. f. Gynäk.*, 1903) has collected thirty-eight cases from the literature where rupture was produced while manually removing the placenta. Twice while removing an adherent placenta situated at the fundus I have found my fingers almost through the uterine wall, an experience which has led me to exert the greatest possible care in performing this simple operation. I have referred elsewhere to the dangers of rupture in subsequent pregnancies when the uterine wall has been injured by the fingers, curette, or uterine sound.

### *Rupture of Uterus early in Labour.*

We must now turn to the last and most interesting group of cases, viz., those in which rupture occurs early in labour.

This group, as regards etiology, stands midway between the two others, for rupture partly results from disease of the uterine wall, and partly from the effect of the conditions mentioned in connection with the previous group.

Personally, I cannot but feel that disease of the uterine wall and probably unrecognised lacerations at previous labours play the most important part, for looking at the recorded cases one is struck with the frequency of previous difficult labours, injuries, or disease. Take the case described by the late Milne Murray (*Edin. Obst. Trans.*, vol. xxvii., p. 39), where the uterus had before been curetted and possibly the wall seriously injured. The various diseased conditions which may exist have already been referred to when rupture during pregnancy was under consideration.

But there is another condition which specially comes into play in ruptures of this group, and it was mentioned years ago by Bandl. The lower segment may have been over-stretched at a previous pregnancy, and consequently, very early in a subsequent one, reaches the same condition. Some of the records would lead one to attach some importance to this view; naturally it will always be very difficult to distinguish rupture caused by such a condition and rupture caused by the giving way of a previous cicatrice.

Freund, such a strong advocate of fixation of the cervix as a cause of rupture, considers that even rigidity of the cervix may bring it about. Personally, I know of no cases of ordinary simple rigidity having been complicated by rupture, and I have repeatedly seen primiparæ in severe labour for several days without any harm resulting to the cervix. It is not to be wondered at that occasionally rupture of the uterus should be associated, more or less directly, with placenta prævia, for a placental implantation weakens the lower uterine segment, and manipulations to arrest hæmorrhage, such as turning, have generally to be resorted to. All authors refer to the occasional association of the two complications. In my list there was one case, in Ivanoff's, twelve. Ivanoff, rightly it seems to me, emphasises the fact that in the vast majority of the cases the laceration was lateral, longitudinal, and incomplete. However, spontaneous rupture does occasionally occur, and a case recently recorded by Marceval is a most striking example. The patient was a primipara. Absolutely nothing was done to interfere with the birth of the child except to rupture the membranes when the os was about three-quarters dilated. The birth of the child quickly followed. The rupture was through the posterior wall of the uterus and was apparently incomplete.

### *Varieties of Rupture.*

In recent years the subject of rupture of the vaginal vault (Colporrhexis) as distinguished from rupture of the uterus has been much discussed. This lesion is no new discovery. Indeed, before Bandl's papers appeared, lesions of this nature received special attention, and were naturally understood better than lacerations of the uterus. Although the lesions have for long been appreciated, after Bandl's papers, laceration of the vaginal vault received less attention than those of the uterus, and indeed until Freund rewakened interest in the subject it was hardly referred to. In recent years the most important paper is one by Kaufman (*Archiv. f. Gynäk.*, 1903, Bd. lxviii., Hft. i., p. 152), who discusses the subject very fully.

Specially liable to this form of rupture are cases of transverse presentations and pendulous abdomen. Generally the rupture is violent and occurs when the hand is being forced into the uterus, although Kaufmann in his collected cases states that only a small proportion were violent. But how is it possible to prove such a statement, for the parts could not be fully examined before version or the other operation chosen was had recourse to.

Clinically it is customary to speak of "complete" or "incomplete" rupture of the uterus. By the former condition we mean that the laceration extends into the peritoneal cavity, and by the latter that it stops short of the coat. This distinction is very useful, for we shall find that the treatment differs in the two groups. As regards the relative frequency of the two varieties, it will appear from most series of recorded cases that complete rupture is more common than incomplete. It must not be forgotten, however, that there are a very large number of cases of incomplete rupture never reported nor indeed appreciated, while few of the cases of complete rupture escape notice, seeing that the symptoms are more grave. Of the 13 cases of rupture under my care, in private and hospital practice, in only 3 has the rupture been incomplete. Braun gives it as 4 incomplete and 15 complete, Merz as 46 incomplete and 181 complete, Ivanoff as 43 incomplete and 58 complete. As would be expected, the lower down in the uterus and the more lateral the tear, the more likely will the rupture be to remain incomplete. The cases of laceration during pregnancy or early in labour are, with few exceptions, complete.

Amongst the cases which have been under my care, on only one occasion have I found the bladder involved. In Braun's 19 cases there was only 1 in which the bladder was injured. Neither in Merz' or Ivanoff's collected cases can I find any evidence of laceration of the bladder. In Murray's most interesting case the bladder was torn and had to be stitched.

Rupture of the bladder apart from rupture of the uterus and retrodisplacement of the gravid uterus, is very rare. Grimsdale (*Journ. Obst. and Gynæc. Brit. Empire,* May 1905) has referred to a most interesting case in which the bladder was injured in the first stage of labour. On opening the abdomen a large quantity of mucous membrane was found in the peritoneal cavity. This had escaped from the bladder through a small opening in the upper part. The opening was closed, and the patient made an excellent recovery.

There is a very interesting group of cases in which the rupture is incomplete, but instead of the peritoneum remaining intact it is the mucous membrane that does so; serous and superficial layers of the muscular coats give way. The point of importance in these cases is that there are all the symptoms of collapse from internal hæmorrhage without any appreciable lesion of the uterus or vagina. The lacerations are most commonly in the anterior or posterior wall. Sometimes, if the uterus is over-distended, the peritoneal coat is not injured, as in a concealed accidental hæmorrhage which was under my care some time ago. Knauer has drawn attention to the subject recently (*Zentralb. f. Gynäk.,* 1903, p. 647); Góth (*Zentralb. f. Gynäk.,* 1904, p. 1559) and Krebs (*Monats. f. Geb. und Gyn.,* Bd. xvi., 204, 1902). In such cases the tears began in in the muscle and extended either outwards or inwards.

### *Symptomatology and Diagnosis.*

The clinical features of rupture of the uterus differ greatly, according as the rupture occurs in pregnancy, early in labour, or after labour has been in progress for some time. In the two former cases there is seldom much warning of the accident, while in the latter, very frequently for some little time before there are premonitory symptoms, which, if properly observed by the accoucheur, should lead him to dread rupture, and consequently to take every precaution to prevent the occurrence.

Taking, first, those cases where the rupture occurs early in labour or during pregnancy, one would naturally expect, as with rupture of any other viscus, that the giving way of the uterus would be followed immediately by very severe abdominal pain, decided collapse, and other symptoms of internal hæmorrhage, small thready pulse, cold sweats, etc. Without doubt, in very many of the cases that is so, and the nature of the condition is self-evident, but what is not fully appreciated is that sometimes these symptoms are not present and the accident is overlooked. The following case of spontaneous rupture of the uterus during pregnancy, through the cicatrice of a Cæsarean section wound (*Journ. Obst. and Gynæcol. Brit. Empire*, 1904, vol. vi., p. 378), illustrates how very gradual the onset of the symptoms may be.

Mrs M., iii.-para, was admitted on 28th October 1901, to the Glasgow Maternity Hospital. In both the previous labours the children were extracted with difficulty, and were dead. On the last occasion craniotomy had to be performed. The pelvis was of the flat rachitic type, the diagonal conjugate being 3¾ ins. I therefore chose Cæsarean section, and employed the "fundal incision" of Fritsch. I came right down on the placenta, which I removed before extracting the child. The child, which weighed 8 lbs., was extracted very easily, and the uterine wound stitched with little trouble or bleeding. She was not sterilised. The temperature was never above normal, and the pulse after the first three days was not accelerated. The wound healed by first intention, the stitches being taken out on the fourteenth day. She left the hospital on 30th November both she and her baby being perfectly well.

The following note was made on her admission for the second Cæsarean section on 26th January 1904. As far as can be judged, the patient is now in her thirty-seventh week of pregnancy; she has been in good health, and has suffered no special discomfort since she became pregnant. She is well nourished and of good colour, her pulse is of good tension, regular in force and rhythm, and numbers 84 per minute. The abdomen is irregularly enlarged, the bulk of the swelling being to the right side. There is a medium firm scar of the previous Cæsarean section. Fœtal movements are active, but the cardiac sounds are nowhere audible. The cervix is not taken up, but admits the tip of one finger.

After an enema, given about midnight, the patient complained of abdominal discomfort—slight pain in the epigastrium; this extended upwards and to the right. She mentioned this to the night nurse, but as she did not complain further and fell asleep, the nurse did not think it necessary to report the fact to the house surgeon. She slept from about 12·30 to 5 A.M., at which time a sanguineous discharge from the vagina was noticed, and slight pain in the right iliac region was complained of. At 7 A.M. the temperature was 97·6 and the pulse 80; the pain which had now spread over the abdomen was not very great, so it was taken for painful uterine contractions. There was no sickness or vomiting. At 11 A.M., on making my ward visit, I spoke to the patient quite by accident, for no one considered her condition serious. I then found that there was considerable abdominal tenderness, and suggested to those present the possibility that the old uterine cicatrice had given way. As, however, the pulse was 84, regular, and of good tension, I simply advised my house surgeon, Dr Rodgers, to go into the case and note the patient's condition carefully. An hour afterwards I was summoned by him, as the abdominal tenderness was now more marked, the pulse 90, the temperature subnormal, and the breathing more rapid. At this time the condition of the abdomen was as follows:—She lay with her feet slightly drawn up; on palpation there was exquisite tenderness over the whole abdomen, more marked to the right and below the umbilicus; the pain also extended up to the right shoulder. On placing the hand over the abdomen one was struck by the readiness with which the fœtal parts could be defined;

above the umbilicus and slightly to the left of the middle line a limb could be made out, while the head lay towards the left iliac fossa. Two tumours could not be differentiated; percussion gave a slightly dull note in the flanks. On vaginal examination the tip of one finger could be pushed through the cervix, but the presenting part could not be felt; on withdrawing the finger it was bloodstained. The pulse numbered 88. Strychnine $\frac{1}{8}$th gr. was given, and the patient prepared for laparotomy. She was anæsthetised, and the abdomen opened along the previous incision. Immediately that was done a large quantity of dark-coloured blood escaped, and the intact membranes and placenta with the enclosed fœtus presented. The uterus lay retracted behind and down towards the pelvis. The membranes were opened into and a well-formed dead child extracted. The uterus was then examined, and found to have a transverse rupture extending over the highest part of the fundus, evidently through the cicatrice of the wound of the previous Cæsarean section. There were only two slight adhesions, one to the omentum and one to the abdominal wall. The uterus was removed by supravaginal hysterectomy, the peritoneum being carefully brought over the stump. Finally all blood clot was removed, and fully two pints of saline solution were introduced into the peritoneal cavity. After the operation the patient was considerably collapsed; the lips, cheeks, and extremities were blanched; the pulse was 126, small, easily obliterated, but regular. She soon improved, however; the following day the pulse was 120 and the temperature 98. She was dismissed a month after the operation, perfectly well.

Sooner or later in all cases symptoms arise, the woman complains of increasing general abdominal pain. She assumes more decidedly the "abdominal" facies, while a more important feature is the steady increase in the pulse rate.

As far as I have been able to find from the records of cases, this quiet rupture rarely occurs in cases of spontaneous rupture early in labour. In all such cases the classical symptoms of rupture are present, and there is no difficulty in diagnosing the fact that the uterus has given way. The same also applies, although not quite so universally, to rupture in pregnancy when that accident follows any fall or strain. The cases in which insidious rupture takes place are those where the uterus is diseased or has been previously injured. In such cases the ovum seems to gradually pass through the uterine tear. Not infrequently the placenta is situated over the tear; quite a number of writers have called attention to this fact.

An interesting case in which rupture was found in progress was the one recorded by Staude (*Zentralb. f. Gynäk.*, 1904, p. 731). Early in labour a small elastic tumour developed over the anterior wall of the uterus during the pains. It was diagnosed as a rupture, the abdomen was opened and the diagnosis confirmed.

But, after all, rupture of the uterus during pregnancy or early in labour, is not a condition which is often encountered, and is, consequently, not a subject upon which one is justified in lingering. We must, therefore, turn to the cases which form the bulk of the examples of rupture of the uterus, those in which the tear occurs late in labour or during attempts at delivery.

In considering cases of this nature it is customary to discuss the symptomatology before and after rupture. This is a wise procedure, for, in a large proportion of cases there are distinct premonitory symptoms. After a prolonged second stage, where the expulsive forces are not at fault, the patient becomes restless and complains of constant pain over the lower part of the uterus, while the uterine contractions tend to become more and more tetanic. In addition, the pulse becomes more rapid and the temperature possibly rises slightly. But along with these symptoms there is a steady increase of the lower uterine segment. This can be easily appreciated, for the retraction or Bandl's ring can be felt to rise higher and higher. There is seldom any difficulty in palpating the ring, for it can be appreciated as a hard ridge round the uterus. I have seen it higher than the umbilicus. It is not always at the same level all round. Especially is this seen in cases of transverse presentations, where one part is subjected to greater strain than the other. One can often appreciate that the wall of the segment is very thin, but, as a rule, it is so tense and tender that the fœtal parts cannot be differentiated. With a uterus in such a state rupture may occur at any time.

How general such symptoms are prior to rupture I have not had opportunities of judging, for, with one exception, the patients have come under my care after the rupture had occurred. From what I have been able to gather, however, in very many cases they were present, and I have many times seen them and dreaded rupture. When a patient is brought into hospital in such a condition, no attempts to deliver by version or forceps are made; decapitation or craniotomy are immediately performed.

Turning now to the symptoms which are associated with rupture, it is a very striking fact that in a large number of cases the rupture has not been recognised until after the birth of the child. The classical symptoms of a sudden feeling of something giving way, of an arrestment of the uterine contractions, of alteration in the shape of the abdominal swelling, of hæmorrhage and collapse, are very frequently absent; nor is this to be wondered at, considering that in many cases the child's head is already well engaged in the pelvis, and the rupture so often takes place during the delivery. Let us consider the symptoms seriatim. In very few indeed of my cases or those reported by Ivanoff and others, has the symptom of a sudden feeling of something having given way been present, and naturally it cannot be expected to be appreciated in the cases of violent rupture, for the patient is then usually under the influence of the anæsthetic. When it does occur the laceration is usually extensive, and the child in whole or in part escapes from the uterine cavity into the abdominal cavity, or into the cellular tissue underneath the peritoneum.

The same remarks apply to arrestment of the uterine contractions. This symptom is again most pronounced where the child escapes into the abdominal cavity. It must not, of course, be confused with the uterine inertia which follows exhaustion of the uterine muscle; the latter is gradual in its onset.

It is hardly necessary to say that an alteration in the shape of the abdominal swelling can only occur if the child passes in whole or in part outside of the uterus, and this, we have seen, does not occur so often as is supposed. When it does occur two abdominal swellings become apparent, the one representing the parts of the child that have escaped, and the other the retracted uterus. Naturally, it is more distinct when the child and uterus lie side by side, for if the retracted uterus is placed behind—as in one of my cases—it is impossible to distinguish the two swellings. When present, it is, of course, a symptom of great importance, especially if beforehand the accoucheur has actually observed the uterine outline.

Occasionally other conditions simulate rupture. Quite recently I saw a case of dystocia from pelvic deformity in a patient who had a bipartite uterus. The double swelling of the uterus and the collapse of the patient led one, on seeing the case for the first time, to think of rupture of the organ. It was a case of accidental hæmorrhage. Similarly, in cases of plural pregnancy the uterus being often irregular and double, a suspicion of rupture of the uterus may arise, if the patient shows any evidence of collapse during labour. Again, in cases where there is a co-existing tumour, either ovarian or uterine, a differential diagnosis has occasionally to be made between such a condition and rupture of the uterus. But a difficulty in differential diagnosis may occur in a much simpler and more common condition, viz., in impacted oblique presentations, for then there are the two swellings with a sulcus between. Very frequently when such cases are brought into hospital we have great difficulty in deciding if rupture has occurred or not. Indeed, often it is only possible to decide by a vaginal examination under deep anæsthesia.

In addition to alteration in outline of the uterus, the fœtal parts become much more easily palpated after the child has escaped into the peritoneal cavity. One must be very careful in deciding upon rupture under such circumstances unless other symptoms and signs are present, for sometimes the uterine wall is so soft and thin that one imagines one feels the fœtal members as if underneath the thin abdominal parietes. In advanced extra-uterine pregnancy the child can also be very easily palpated.

The amount of hæmorrhage which occurs as a result of rupture of the uterus varies very greatly. Amongst my own cases I have only had three in which it was extremely severe. Ivanoff in his long series of 124 collected cases found 53 in which the hæmorrhage proved fatal, and in half of them not until many hours after the accident.

One may be deceived in respect to the actual quantity of blood lost, for a considerable amount may escape into the peritoneal cavity, or into the cellular tissue around the uterus and remain concealed. Sometimes very little blood escapes from the vagina. The reason for this is the relative situation of the tear to the larger vessels, and the fact that the latter do not tear readily. In the last case of rupture upon which I operated—Case of complete Rupture of the Uterus, with escape of the Fœtus into the Peritoneal Cavity: Panhysterectomy: Recovery (*Brit. Med. Jour.*, vol. ii., p. 445, 1907)—the tear was along the side of the large uterine artery, which could be seen pulsating, but only the smaller veins were torn. The case may be described here in brief.

Mrs X., ii.-para, aged 24, had been delivered by craniotomy four years before her present admission on 18th March 1907. Present labour came on at term. Attempts at delivery with forceps failed, after which she was sent into the Maternity Hospital under my care. When I saw her a little time after her admission her pulse was 140, and she was evidently ill but not seriously collapsed. My house surgeon informed me that she was worse than when she was admitted. There was no history of sudden pain or of anything having "given way." She was not very blanched. I could feel the child free in the abdominal cavity. From the vagina I could feel an extensive tear on the right side of the uterus and vaginal vault. There was no profuse vaginal hæmorrhage. Upon opening the abdomen I found the fœtus free in the abdominal cavity, which also contained meconium, vernix caseosa, liquor amnii, and a little blood. After removing the child and placenta I examined the rupture, and found that it extended vertically through the right lateral wall of the lower segment and transversely in front, so that only a small portion of cervix remained attached to the bladder. The bladder itself was not injured.

I clamped and then divided all the uterine attachments, and removed the uterus entirely. I then packed the lower part of the pelvis with gauze and closed the abdomen. The whole operation did not take twenty-five minutes. The patient soon got over the shock, and made an uninterrupted recovery.

I have already quoted Ivanoff's experience and my own, which agrees with it. In the most recent paper on the subject, that of Eversmann (*Archiv f. Gynäk.*, 1905, lxxvi., p. 601), this writer states that only in some 12-15 per cent. of cases does the blood come from the ruptured uterine vessels. It is a very erroneous idea, therefore, but one generally expressed by those with little experience of this complication, that rupture of the uterus is followed immediately by profuse bleeding. Infinitely more common is a steady but slow hæmorrhage. The pulse rate in such cases slowly rises, and uneasiness and general abdominal pain and the ordinary symptoms of collapse become gradually more pronounced. The case already recorded is an illustration of this, as was also one brought to me from the country some little time ago. The patient, although driven thirty miles, had absolutely no symptoms of collapse, and a pulse of not more than 80. She was found to have a complete rupture of her uterus. I removed the uterus, and she made a most satisfactory recovery.

When all the classical symptoms are present there is very little difficulty in coming to a diagnosis. There are few other conditions associated with similar symptoms. Accidental hæmorrhage, or placenta prævia, is undoubtedly attended with all the symptoms of collapse and profuse hæmorrhage, but a vaginal examination, at least in the case of placenta prævia, reveals the condition. With accidental hæmorrhage, either apparent or concealed, it occasionally happens that the diagnosis is rendered difficult, and scattered through obstetric literature are several recorded cases of mistaken diagnosis. In such, the history of the case and a careful vaginal and abdominal examination, if need be under deep anæsthesia, will usually clear matters up.

The diagnosis between complete and incomplete rupture can only be arrived at by vaginal examination, except in the cases where the child is evidently free in the peritoneal cavity. When the rupture is complete one feels the intestines distinctly, when it is incomplete that is not possible. In theory, that is simple enough, but once or twice I have had a little difficulty in deciding, for the peritoneum is very thin. Some time ago I performed hysterectomy upon a case of rupture sent into the hospital by a confrère of great obstetric experience. He had packed the rent, and told me it was complete, as he had felt the intestines between his fingers. When I opened the abdomen there was no laceration of the peritoneum.

### *Prognosis.*

The prognosis of rupture of the uterus is much more favourable to-day than it was when the condition was treated expectantly. When the latter treatment was in vogue many cases were, of course, never appreciated, but, even amongst those which were recognised, occasional recoveries followed. A former physician of the Maternity Hospital told me of one in which, after delivery of the child, he had pushed his hand through the extensive and complete rupture and had easily felt the bowels, but yet the patient made an uninterrupted recovery.

Scattered through obstetric literature are many extraordinary cases, but certainly amongst the most wonderful was one recorded by Leopold (*Archiv f. Gynäk.*, 1896, vol. lii., p. 376), in which rupture occurred at the fourth month, and yet pregnancy continued to term, when the child died. On opening the abdomen three months later, the child was removed. Its umbilical cord was found to run through an opening in the posterior wall of the uterus. But it is profitless to consider such rarities.

Various estimates are given of the mortality from the expectant treatment, but it appears to have been 90 per cent., at least amongst recognised cases of complete rupture. Naturally, it was much lower than in the incomplete variety.

In recent years, with a more exact understanding of the condition and active treatment, the mortality has fallen fully a third. It is still, however, 50-60 per cent., being a little higher than that figure for complete and a little lower for incomplete rupture. This question, however, will be more carefully considered when the different methods of treatment are being discussed.

### *Treatment.*

As rupture of the uterus is so often a preventable accident, it is necessary that I should say a word or two about its prophylaxis. As regards those cases where the uterus has been previously injured, either by tears, incisions, curettage or disease, subsequent pregnancies should be watched, and especially should the patient be under careful observation during the later weeks, so that, should rupture occur, an operation could be immediately undertaken. The same applies to those whose previous labours have been difficult and protracted, owing to malformations of the pelvis, or undue size of the children; for, as we have seen, previous lacerations are often passed unrecognised, and a lower segment which has once been overstretched yields and tears more readily.

As the danger of rupture during the first stage is practically nil, excepting in cases where there have been previous lacerations or injuries to the uterus, there is nothing to be done.

In the second stage, however, if any of the premonitory symptoms of rupture arise, delivery must be carefully completed. In contracted pelvis the degree of deformity and the relative size of fœtal head and pelvis should be carefully calculated, and the safest treatment had recourse to. As rupture of the uterus so commonly occurs in neglected transverse presentations, it is of the greatest importance that such a malposition of the child should be early recognised and corrected; but if, for any reason, the presentation has not been appreciated, or the accoucheur has not seen the case until after labour is far advanced attempts at version must on no account be made unless there is every prospect of the child being easily turned. The disastrous results that follow attempts at version in neglected cases are greatly to the discredit of the obstetric art.

Hydrocephalus, another condition, as we have seen, occasionally followed by rupture, is much more difficult to recognise, especially if the child presents by the breech.

Before leaving the subject of prophylaxis, I must warn the accoucheur against the danger of performing vaginal operations, such as turning, etc., with the woman only partially anæsthetised. Strong uterine contractions of the abdominal and pelvic muscles and of the uterus are set up by the introduction of the hand, and in consequence, many cases of rupture, especially of rupture of the vaginal vault, are brought about by the operator requiring to employ undue force in overcoming the resistance of the uterus.

### *Active Treatment.*

The treatment of rupture of the uterus when it has occurred is a subject regarding which there are still considerable differences of opinion, and, in all probability, it will continue in this position for some time to come.

Before, however, the active treatment of rupture can be discussed, we must consider what is to be done with the child if it is still undelivered when the rupture is recognised. In certain cases this is easy to decide, in others it is difficult. If the head is presenting and can easily be reached, it should be extracted with forceps. Often it will be necessary to perforate it, for in many such cases the pelvis is deformed, the head is of unusual size, or in an unfavourable position, and the child is dead or dying. Similarly, if the breech is accessible, and one or both legs can be seized, the child should be extracted by traction, and if there is any difficulty with the after-coming head, it should be perforated.

Another group of cases in which the course of treatment is obvious are those in which the child has entirely escaped into the abdominal cavity. In such cases the uterus has retracted and extraction *per vaginam* is evidently impossible, consequently the fœtus must be removed by abdominal section. The cases which present the greatest difficulty are those where the child has partly escaped through the rent. In very many of these the presentation was originally transverse, but in some the head was the presenting part. Whatever the presentation is, the head is the part which is generally through the rupture. In such cases the course to be pursued will depend upon whether or not one intends to continue the further treatment of the case oneself, or to place the patient in the hands of another, be it in the woman's own home, a hospital, or a nursing home. The reason for this is obvious, in all probability the tear is firmly grasping the child, the child is acting as a plug. It should only be removed, therefore, when the operator is ready to proceed with the further treatment. Whoever takes charge of the further care of the patient will have to decide between removing the child per vaginam or per abdomen, because if he drags up the child after opening the abdomen he will bring infection from the vagina. The vaginal delivery will be best accomplished by bringing down one or both feet, rarely will it be possible to complete by craniotomy or decapitation. The cases in which the operator should choose the abdominal route are where the child's shoulders are beyond the tear. The treatment of the lacerated uterus after the child has been delivered depends largely upon the variety of rupture. In cases of incomplete rupture plugging the tear is the best course. There are two ways of plugging the tear—it may be done tightly or loosely. The former method must be employed if the bleeding is at all severe, but the latter, especially if a drainage tube is inserted along with the gauze, gives better drainage. It is not necessary to douche out the tear before plugging. The gauze should be inserted with the cervix steadied by means of volcellum forceps.

In cases of incomplete rupture in which the abdomen is opened under the suspicion that the rupture is complete, it is usually advisable not to remove the uterus but to plug the cervix from the vagina and close the abdomen.

A very pertinent question in connection with this method of dealing with a ruptured uterus is the subsequent treatment of the organ, for the danger of rupture at a succeeding pregnancy is considerable, as recorded cases show. A ragged tear treated by plugging must always be followed by a cicatrice, which is liable to give way in a succeeding pregnancy, and not only in the later weeks but even as early as the fourth and fifth months. Probably the safest course to pursue in such cases is to remove the uterus some time after the patient has recovered from the accident. If the accoucheur deems it safe enough to permit the patient having another pregnancy, he must make sure that she is kept under observation during the later weeks of pregnancy in case at any time the old tear gives way.

With the great improvement in technique and the results from abdominal surgery, it was not to be wondered at that good results were expected from opening the abdomen and removing the uterus or stitching the tear. But I fancy most of us who have adopted such a course have been not a little disappointed with the results. Without doubt a large number of cases have been saved by such treatment, three cases in my own list were successful, and all other operators of any experience have had occasional recoveries; but the mortality is still extremely high, because of the unsatisfactory condition of the patient at the time of the operation and the sepsis that so frequently follows. Of my total cases, three died of shock very shortly after the operation, and four died of sepsis. One is not disheartened by death from shock, for it is often impossible in this condition to prevent it; but it is very disappointing when a patient recovers from the shock and dies of sepsis. In my four cases which died of sepsis the patients died on the fourth, fifth, and thirteenth days respectively. It is not to be wondered at that septicæmia should so frequently follow. Many of the cases have been carelessly handled by incompetent midwives or practitioners, and the tissues have been much bruised, micro-organisms have been introduced and actually rubbed into the tissues during the various manipulations carried out, and the patients are exhausted by prolonged labour and loss of blood. Could anything be more favourable for the occurrence of infection.

*Table of Author's Fourteen Cases.*

| | Number of Cases. | Maternal Deaths. |
|---|---|---|
| Died unoperated upon (all complete) . | 2 | 2? |
| Plugging (all incomplete) . . | 3 | 0 |
| Hysterectomy (Porro's) (all complete) . | 1 | 1 |
| Hysterectomy. Retroperitoneal treatment of stump. (One incomplete, others complete) . . . | 5 | 3 |
| Panhysterectomy (all complete) . | 3 | 2 |

Total maternal mortality for hysterectomy (9 cases, 3 deaths), 57 per cent.

When the abdomen has been opened for the purpose of extracting the child, or when abdominal section is decided upon after the child has been removed by the vagina, there are several modes of dealing with the uterus:—

(*a*) Complete removal of the organ—Panhysterectomy.

(*b*) Supravaginal amputation with retroperitoneal treatment of the stump.

(*c*) Amputation of the uterus after Porro's method.

(*d*) Stitching the laceration and plugging.

*Panhysterectomy* is the most radical treatment.

Klein (*Archiv f. Gynäk.*, 1901, lxii., Hft. ii., p. 193) in his thirty-eight collected cases, 1880-1900, states that total hysterectomy was performed thirteen times and the mortality was 54 per cent. Eversmann (*Op.*, p. 663) put it at 54 per cent., while in my collected cases from English and Continental literature for three years, 1903-1905 inclusive, there were 7 deaths in 20, a mortality of 35 per cent. These latter figures, however, do not, I believe, represent the actual mortality from the operation. For statistical purposes individual cases are of little value, one requires to get a series of cases from different authors. At the present moment the operation of total extirpation has, I feel sure, a mortality of over 50 per cent.

The method of carrying out the operation is detailed elsewhere. It is the operation which I think will ultimately give the best results. The only treatment which I think may come into competition with it is simple stitching of the peritoneum and draining. I shall refer to this treatment later.

Panhysterectomy is the sound treatment theoretically, because by this method one removes the uterus body and cervix, both of which are infected. If the cases of ruptured uterus which die of sepsis are examined, it will be found that the sepsis is generally local. That being so, the best thing to do is not only to remove the whole uterus, but to pack the pelvis with iodoform gauze, bringing the end through the vagina and leaving the gauze in for three or four days. I used to be afraid of leaving the gauze in so long, but I often do it now when I make a complete clearance of septic reproductive organs.

*Supravaginal Amputations.*—The operation which is most favoured when hysterectomy is performed is supravaginal amputation of the uterus with retroperitoneal treatment of the stump. In other words, the peritoneum is stitched over the stump. The steps of the operation have been already fully described. The advantages claimed for this method are that it is easier than total hysterectomy, takes less time, and so is attended with less shock. I think these advantages are theoretical largely, and I feel sure they are more than counterbalanced by the effects which result from leaving the ragged infected stump of the cervix behind. Klein gives the mortality by this method in fifty cases as 46 per cent. In Eversmann's collected cases the mortality works out at 51 per cent., and for my collected cases at 35 per cent.

My own personal experience has been very unfortunate. I have adopted this method of operation seven times, but have had only two successes, a mortality of 71 per cent. Three patients died of shock a few hours after the operation, and the others of sepsis on the fourth, seventh, eleventh, and thirteenth days respectively. This is the great danger. In reading over the recorded cases it appears that the best results are obtained by simply bringing the peritoneum over the stump, not carefully stitching the latter, as described. The late Dr Milne Murray (*Trans. Ed. Obst. Soc.*, vol. xxvii., p. 39) specially referred to that, in a case he recorded shortly before his death. In addition to giving good drainage it saves time, so that the operation can easily be carried out in twenty minutes. The cellular tissue should also be drained by gauze loosely packed round a rubber drainage tube.

*Porro's Operation.*—Formerly the removal of the uterus and the treatment of the stump, after Porro's method, was most favoured; but in recent years it has almost been given up, so that in cases collected from the literature, 1903-1905, I found only ten reported, with 50 per cent. mortality. Porro's method is a very crude method of treating the stump. The claim by Spencer, Fehling, and a few others for its employment in certain cases of Cæsarean section where the uterine cavity is infected I can understand, but its employment in rupture of the uterus is of no advantage, for the cervix, the vaginal vault, and the cellular tissue are infected.

*Stitching the Laceration.*—It is very probable that the last method—stitching the peritoneum—may come into favour, as it has been recently advocated by no less an authority than Zweifel, whose results from hysterectomy have been so unsatisfactory (*Hegar's Beiträge*, Bd. vii., s. 1). He advocates a very careful abdominal toilet, stitching the peritoneal coat; but is opposed to draining from the vagina. The method has this great advantage that it can be easily performed and may be carried out in the patient's own dwelling, as witness a most interesting case recently recorded by Down (*Lancet*, vol. ii., 1904), who not only saved the mother but saved the child also. It is a mistake, however, not to drain, for there must be some infected material left in the peritoneum. Eversmann's figures indicate that the results are better when drainage is employed.

It is very questionable if stitching the whole thickness of the torn tissue is advisable, for it is not very sound surgery to stitch a lacerated infected wound.

*Plugging and Drainage.*—Plugging and draining the tear, even although the laceration is complete, is favoured by several operators, and in this country has a strong advocate in Spencer. At the present time I believe it gives the best results. In one respect this is highly satisfactory, for it is the simplest treatment for the practitioner who has had no experience of abdominal surgery. Naturally, in all cases when this conservative method is employed, the accoucheur must make sure that all bleeding is arterial. Personally, I believe that complete removal of the uterus with subsequent packing of the pelvis with iodoform gauze will ultimately give better results.

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*The President* thanked Dr Munro Kerr for laying these cases before the Society.

*Dr Haultain* said he had had six cases of rupture of the uterus. Out of three cases where he performed hysterectomy, two had died. Where he had resorted to plugging, all three had recovered. He perfectly agreed with what Dr Munro Kerr had said about plugging. He had no doubt that plugging was the best treatment. Hæmorrhage was very slight. In cases where the abdomen had been opened, the amount of blood discovered was very little, and plugging was sufficient to arrest this.

*Dr Fordyce* asked Dr Haultain whether he would plug in cases where the child had been delivered through the abdomen as well as in cases *per vaginam.*

*Dr Haultain* replied that he would stitch the uterus and leave a drain. He agreed with Dr Munro Kerr's remarks about the pulse. In the majority of his cases the pulse had been under 90, with subnormal temperature. In these cases the temperature was more important than the pulse.

*Dr Fordyce* said that his experience was limited to two cases. No. 1 was admitted to hospital in a state of great collapse, and died after the removal of the uterus. No. 2 was a case of a six months' pregnancy, attended by a student, where the uterus had been split from fundus to cervix, and there had been great loss of blood. The bladder, however, was untouched. He had resorted to packing, and the patient recovered.

## VII. NOTE OF A CASE OF HYSTERECTOMY FOR FIBROID TUMOUR UNDER SPINAL ANÆSTHESIA.

By W. Fordyce, M.A., M.D., F.R.C.P.E., Assistant Gynæcologist, Leith Hospital.

Spinal anæsthesia is not likely, I think, ever to replace a general anæsthetic in major gynæcological operations. Partly I think because, as Tuffier has stated, it is not very suitable for intraperitoneal operations, on account of the vomiting which is apt to take place, inconveniencing the operator, but chiefly on account of the limited duration of the anæsthesia produced, viz., about fifty minutes. Still, that it can be safely and successfully used when a general anæsthetic is dangerous, is now well known.

As the subject has not been previously brought before the Society, I thought the following brief note of a case recently under my care might be of some interest to the Fellows, and worthy of recording.

The patient, Mrs S., æt. 48, who had on two previous occasions been under my care in Leith Hospital, was readmitted on 3rd February, on account of severe floodings and great pelvic pain. The last flooding had continued without intermission for three weeks, and had reduced her to a state of extreme anæmia and exhaustion. She also complained of palpitation and breathlessness.

*Previous History.*—She had had two children, the last sixteen years ago, and up to ten years ago had enjoyed good health. There is no history of her having had rheumatic fever. About ten years ago her periods began to be excessive, and since then have gradually increased in severity, so that for the past five years she has been more or less of an invalid and rarely out of bed.

For the past year the discharge has been practically continuous though not always profuse.

Eighteen months ago she was admitted to Leith Hospital, when she was told she had a fibroid of the uterus and heart disease. Her cardiac symptoms were so pronounced that Dr Ferguson, Dr Langwill, and myself thought it impossible she could stand such a serious operation as removal of the fibroid. Six months after her leaving Hospital, she was readmitted to the medical wards on account of her cardiac symptoms. The question of operation for removal of the fibroid was again considered, and again thought inadvisable.

Prior to her admission for the third time on 3rd February of this year the pain had been very severe, preventing her getting any rest or sleep, and there had been a specially severe flooding for three weeks.

It was chiefly, however, on account of the unbearable pain that she was admitted on this occasion.

On examination, I found that the fibroid tumour had not apparently increased much since I last saw her, being about the size of a five months' pregnancy. From the severity of the hæmorrhage and the severe pain I thought it probable that the tumour was submucous, but the external os was closed, and without dilatation one could not have determined this with certainty.

Her general condition, however, was worse. She was profoundly anæmic, weak, and exhausted with the pain and hæmorrhage, and the cardiac condition which prevented us operating on former occasions was also worse. The pulse was rapid and very irregular, and loud murmurs were heard all over the cardiac area. She was breathless, though not markedly so, and there was slight œdema. The pain, as I have stated, was the outstanding symptom, and caused her most distress. For this she had morphia, and, under treatment by cardiac tonics and the hypodermic injection of ergotin, she had so much improved by the end of a fortnight that, after consultation with my senior colleague, Dr Haig Ferguson, I decided to risk the removal of the tumour. This was at the urgent request of the patient herself, who was prepared to take any risk for the relief of the pain, and who said that if nothing were done this time, she would commit suicide, as she could bear her sufferings no longer.

On the evening before the day fixed for the operation, Dr Lochhead, who was then house surgeon, telephoned that she was much worse, and that he did not think she could possibly stand the operation on the following day. On seeing her I had no hesitation in coming to the same conclusion, for the heart's action was very laboured and markedly irregular, more so than it had ever been.

I then, for the first time, thought of the possibility of performing the operation under spinal anæsthesia, and Mr J. W. Struthers, who saw her then with me, thought it was a fair case for this, and very kindly undertook its administration.

On 20th February, an hour before the operation, the patient had $\frac{1}{3}$ of a gr. of morphia hypodermically.

Mr Struthers then injected between the third and fourth lumbar spines, into the subarachnoid space, 6 centigrammes—*i.e.*, just under one grain—of tropacocaine in a 5 per cent. solution of distilled water.

About 15 c.c. of cerebro-spinal fluid were first withdrawn, and the dose of tropacocaine then diluted with 5 c.c. of the cerebro-spinal fluid and injected. The patient was then laid flat at first, and at the end of ten minutes, when anæsthesia seemed established, the head was slightly lowered in a modified Trendelenburg position. Mr Struthers said we could depend on anæsthesia lasting for about forty-five minutes.

Dr Haig Ferguson and I then proceeded to do the operation as quickly as we could together. He ligatured the ovarian and uterine on the one side, while I did those on the other. Thrice during the course of the operation we were interrupted for a short time owing to the patient becoming sick and retching. This we noticed occurred when we were making traction on the tumour. The technique was rendered slightly more difficult than usual, owing to the fact that we could not place the patient in the full Trendelenburg position. Extreme elevation of the pelvis is supposed to be dangerous, because in this position the anæsthetic solution may come into direct contact with nerve roots springing from the medulla and so give rise to serious complications; but we were able to complete all the details of the operation, and it was only with the last two superficial sutures in the abdominal incision that the patient for the first time winced and said she felt any pain. The operation lasted forty-three minutes, and in forty-five minutes the patient was back in bed. In a few hours she was given some fluid nourishment. There was no headache and no after sickness and no cardiac depression.

She made an uninterrupted recovery, and when I saw her a few days ago she had walked up to the hospital, and stated that she was able to be up all day and to go out, which she had not done for five years.

She was much less anæmic, and her pulse was 78 and regular. There were slight murmurs in the mitral and aortic regions, but I am of opinion that her cardiac symptoms were more due to a general malnutrition than to any organic valvular lesion.

Tropacocaine, which a year ago fell into disuse in favour of stovaine, is now regarded by Bier, Strauss, and Oehler as the safest drug in the great majority of cases, and is used by them exclusively. Sonnenberg, Füster, and others, however, prefer novocaine or stovaine.

Mr J. W. Struthers, in a review of recent work in spinal anæsthesia published in the *Edin. Med. Jour.*, says:—

"Oehler's summary of 146 cases in which tropacocaine was used, may be cited as typical of present-day results. In six cases anæsthesia was quite insufficient; general anæsthesia had to be employed in addition in eight cases; four patients suffered from sickness and vomiting during operation, and five from temporary collapse; eight patients had headache and sacral neuralgia after operation. The average duration of anæsthesia was three-quarters of an hour with a dose of 0·05 to 0·07 grm. . . .

"Its use is specially dangerous in severe infective conditions, four cases of death from suppurative meningitis having been published . . . and in three of these four severe infective diseases were present elsewhere when the injection was made. The fourth was a case of operation for hæmorrhoids. Disease of the central nervous system, especially perhaps of the cord, is also regarded by most as a contra-indication against the use of spinal anæsthesia. In the absence of these contra-indications many now prefer spinal to general anæsthesia for any operation in which the anæsthesia may reasonably be expected to suffice. It must be admitted that its use appears to be free from the occurrence of sudden, totally unexpected deaths which sometimes occur under general anæsthesia. In cases of grave respiratory embarrassment or cardiac weakness, where local anæsthesia cannot be borne, it probably throws less strain on the patient than the use of chloroform or ether."

In conclusion, I must express my indebtedness to Dr Haig Ferguson for his kind assistance at the operation. Without his skilled aid it would have been impossible for me to complete the operation in the time at our disposal. Also to Mr Struthers for superintending the anæsthesia, and the skilful manner in which he obtained the desired result.

*Dr Haig Ferguson* said he had been much struck by the anæsthesia produced by the spinal method. So far as it went it was perfect. This patient would not have survived under any other method. There were three points to be noted in this method as regarded abdominal work. (1) The retching was a serious annoyance and cause of delay; (2) It was not possible to get the patient into the Trendelenburg position; (3) If there had been any complications (such as adhesions, etc.) the operation could not have been performed in the requisite time. One could not, therefore, recommend the method as a routine procedure in abdominal cases. It seemed to him that there was slightly more difficulty than usual in retracting the abdominal walls. He congratulated Dr Fordyce on the success of the operation.

*Mr Struthers* said that the French surgeons used the Trendelenburg position. Accidents, however, had occurred during its use, and he did not care to recommend it. It must be admitted, however, that the spinal method was safer than the majority of anæsthetics in special cases. Operations must be in duration less than three-quarters of an hour.

*Mr Scott Carmichael* had seen the method used in Germany in 3 cases. In 2 cases there were marked symptoms during operation. Vomiting occurred in 1 case, and the operators had to stop. In the other case there was collapse, and the operation had to be stopped. He had, therefore, not formed a high opinion of the method. Kreunich had recently published an article on 1000 cases in gynæcological surgery, where he said it was safer in pelvic cases. A great deal depended on the specific gravity of the solution used. Different fluids had been injected and the specific gravity should be the same as the specific gravity of the spinal fluid. In using the Trendelenburg position it was of great importance that the specific gravity of the fluid used should be low.

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## MEETING VII.—JUNE 10, 1908.

Professor STEPHENSON, *President, in the Chair.*

I. The following gentleman was elected an Ordinary Fellow of the Society:—T. Y. Finlay, M.B., Ch.B., Leith Hospital.

II. *Sir A. R. Simpson* showed the PELVIMETER OF PROF. KINOSHITO OF TOKYO UNIVERSITY. It was very ingeniously contrived to secure portability, and had adaptable to it a disc and plumb for ascertaining the angle of inclination of the pelvis. Sir Alex. Simpson had gone to Japan with his son, Rev. Hubert Simpson, to attend the International Conference of the World's Student Christian Federation, held in Tokyo from the 3rd to the 7th of April 1907. The medical, the surgical, and the obstetrical societies of Japan had been holding their respective annual meetings on the days preceding the opening of the conference. Our professional brethren vied with each other in showing kindness to the visitors; the members of the medical society having a reception at 6 o'clock on the evening of the 2nd, and the conjoint physicians and surgeons entertaining Prof. MacAlister and Sir Alexander the following evening. As for the obstetricians, Sir Alexander had the opportunity of attending their forenoon sitting on the 2nd, witnessing a demonstration with the epidioscope, and offering the congratulations of the oldest obstetrical society to its hopeful youngest sister. In the evening they had provided an entertainment with performances by clever jugglers, dancers, and actors, and speeches in the intervals between the lengthened courses of food; winding up by the presentation of a lacquered box containing an album with the autographs of all the members of the Japanese Obstetrical Society. Sir Alex. showed the box and album, and also another album which had been presented to him by the members of the Obstetrical Society of Kyushu, on the occasion of his visit to Kumamoto, the educational capital of the great island that lies to the south of Japan's inland sea. The Kumamoto album is illustrated with a serious of drawings by famous Japanese artists, representing the twelve months of the year.

III. *Dr Haig Ferguson* showed—(*a*) A SPECIMEN OF DOUBLE UTERUS AND DOUBLE VAGINA. The specimen had been procured accidentally at a post-mortem examination, and no history of the case was to be got. Besides the complete septum which existed, the uterus showed markedly, from its external configuration, its double nature. The woman was a young nullipara.

(*b*) A UTERUS REMOVED BY ABDOMINAL HYSTERECTOMY, WHICH CONTAINED MORE THAN NINETY SUBMUCOUS FIBROIDS. The patient is a married woman, aged 30, and has had no children. She had double salpingo-oöphorectomy performed upon her in June 1907, but came to the Infirmary in March 1908, complaining of copious hæmorrhage, which had continued since the previous January. She was extremely anæmic, and also complained of great shortness of breath and general weakness. The pathologist's report showed no malignant tendency.

(*c*) A FIBROID UTERUS, removed by abdominal hysterectomy, from a nulliparous patient aged 37, which had caused serious pelvic obstruction. The patient had had whooping-cough about three months ago, and her violent attacks of coughing had evidently forced the tumour into the pelvis, where it had become completely impacted. The fibroid bore a close resemblance in size and shape to a fœtal head, and very accurately fitted the pelvic cavity.

IV. *Dr Ballantyne* showed—(*a*) A DERMOID CYST with twisted pedicle on one side of the pelvis, with a fibroid tumour on the other. The patient, aged 41, had suffered from diminution of the menstrual flow, and, for two years, had complained of abdominal pain. She had suffered from several of these attacks, the last being three or four weeks ago, and they were severe enough to keep her in bed for a week at a time. The operation was performed that morning, an ovarian cyst with twisted pedicle being diagnosed. It turned out to be a dermoid tumour with a fibroid tumour on the right side.

(*b*) AN ANENCEPHALIC FŒTUS. The mother was a twin and one of a family of fourteen. She had had one child previous to this, before time, but healthy. Her sister was married but had no children. This case went to prove that twins were more liable to produce such fœtuses. Such cases, however, were usually female, this specimen being a male.

(*c*) COPIES OF NOTES OF HIS OWN MIDWIFERY LECTURES IN CHINESE, showing the extreme care of the student, and excellent drawings.

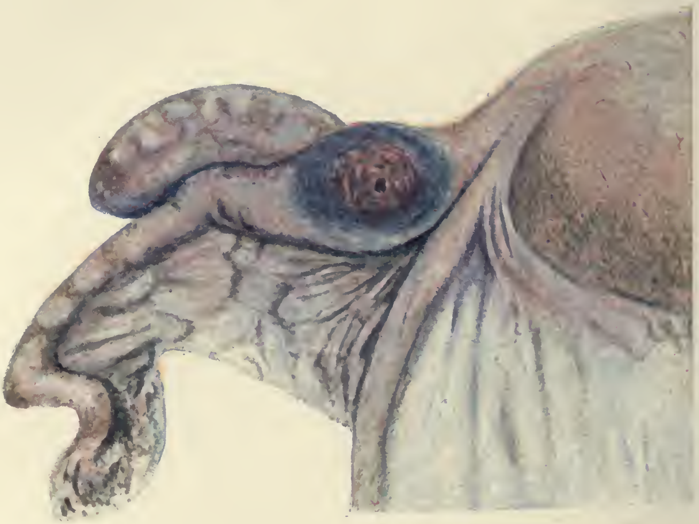


PLATE I.

[*Face page* 229.

# V. THE ANATOMY AND HISTOLOGY OF AN EARLY TUBAL GESTATION.

## WITH LANTERN DEMONSTRATION.

By Henry Wade, M.D., F.R.C.S.E., Lecturer on Surgery, School of Medicine of the Royal Colleges, Edinburgh; Conservator of the Royal College of Surgeons Museum, Edinburgh; Assistant Surgeon, Leith Hospital; and B. P. Watson, M.D., F.R.C.S.E., University Gynæcological Tutor, Royal Infirmary, Edinburgh; Gynæcologist to the Cowgate Dispensary.

Of late years a great deal of work has been done on the anatomy of the pregnant tube. Many points are, however, still in dispute, and although we can add little that is new, we feel that the following description of the findings in an early case is worthy of being placed on record. The pregnancy is a fairly early one—probably between the second and third week—and as the affected portion of the tube was examined by means of serial sections, 1971 in all, and the other pelvic organs were obtained, post mortem, in a fresh condition, a complete picture of the condition can be presented. The case is further of interest from the fact that the patient died of internal hæmorrhage from a minute perforation of the tube wall, a termination which is not frequent at such an early period.

The history of the case is as follows. The patient was an unmarried woman, aged 30, employed as a shop assistant. She had for some time been subject to gastric disorder, for which she was from time to time treated by her medical attendant. On the night prior to her death he was called in on account of some slight abdominal pain and diarrhœa, and, seeing her again next morning, the symptoms suggested to him that she was suffering from a recurrence of her gastric trouble. He was informed that she had had a normal menstrual period two or three weeks previously. She became rapidly worse in the afternoon, and when seen by Mr Caird in consultation early in the evening was so ill as to put operation out of the question. She died shortly afterwards, and, as the diagnosis was very uncertain, a post-mortem examination was immediately made at the request of her doctor and Mr Caird. To them we are indebted for permission to publish the case.

*Post mortem.* The body was that of a well-developed adult female. On opening the abdomen dark fluid blood welled out, and the abdominal viscera were bathed in blood, while in the pelvis were large clots. The blood and clots when removed filled a large wash-hand basin two-thirds full. The pelvic contents, when examined from above, showed at once the source of hæmorrhage. At the uterine end of the right Fallopian tube there was an almond-shaped swelling measuring a little over 1 cm. in its long axis. This was of a dark, almost prune juice colour and covered by glistening peritoneum, except over a small area about the middle. In this region a lighter brownish-red coloured zone was visible; this was covered by peritoneum, which was more opaque and lustreless, and in its centre a minute perforation was present from which blood oozed on gentle pressure. The condition was diagnosed as a ruptured tubal pregnancy.

The right ovary showed no abnormality, but the left was enlarged and cystic, and growing from the junction of ovary and ovarian ligament was a small fibroma. The uterus was enlarged, soft, and somewhat boggy to the touch; on section its cavity was lined by a thick decidua.

The pelvic contents were removed *en masse* for further examination. The other organs of the body, heart, lungs, liver, etc., showed no evidence of disease except the extreme anæmia from death due to hæmorrhage. The swelling on the tube before mentioned was found on closer examination to be situated in the isthmus. It bulged more towards the broad ligament attachment than to the upper surface, along which the thickening due to lumen could be traced almost to the middle of the swelling. It measured 1·3 cm. in length, 1 cm. in breadth, and 1 cm. in thickness. The rest of the tube, including the fimbriated end, appeared quite normal. There was slightly more tortuosity in the right (pregnant) tube than in the left (Plate II.).

The gestation sac and adjoining parts of the tube were fixed in formaline, embedded in paraffin, and cut in serial section for microscopic examination. The proximal and distal portions of the tube were also examined microscopically as well as the following tissue: the left tube, uterus, cervix, right and left ovaries, part of ovarian ligament, broad ligament, and cellular tissue in region of uterine arteries.

In discussing the results of this examination we shall take up the points in the following order:—

1. The anatomy of the pregnant tube, especially with reference to the possibility of the presence of diverticula of the lumen.
2. The method of embedding of the ovum.
3. Decidual formation in pregnant tube and other tissues.
4. The trophoblast and its mode of invasion.
5. The ovum with its embryo and membranes.

*Anatomy of the Pregnant Tube.*—On transverse section of a portion of the affected tube on the uterine side of the gestation sac the following appearances are presented (Plate III., Fig. 1). The muscular and fibrous tissue constituting the greater thickness of the wall show no abnormality. The lumen is centrally situated and is lined by a mucous membrane covered with columnar epithelium. The villous processes of mucosa are more numerous and complicated than usual, and join across the lumen to produce a net-like or honeycomb appearance on section. On these villous processes the epithelium is swollen and in many places desquamated. The fibrous tissue core shows marked engorgement of the blood capillaries with proliferation of the endothelial lining and accumulation round the vessels of cells mainly of the small lymphocyte type, but also all intermediate forms from these to fully-formed polyblasts. The fixed connective-tissue cells of the part are also swollen up and increased in number. In sections nearer the growing ovum active proliferation of these latter cells would appear to explain the presence of the young spindle-shaped cells which have the appearance of being the precursors of a decidual reaction in the villous process of the tube. In sections still nearer the site of the ovum the villous projections of the mucosa become less complicated, and gradually disappear until finally only one large projection is visible, and in this, as will be shown later, there is a marked decidual reaction. The epithelial lining of the tube remains intact until it is replaced by fibrinous exudate which intervenes between the lumen and the ovum bed. On the other side of the gestation sac, towards the fimbriated end, no such adhesion of the villous processes is present, the mucosa being of normal appearance (Plate III., Fig. 2).

In tracing the tube lumen through successive sections, a further interesting appearance is demonstrated (Plate V.). In the sections beyond those showing the above described honeycomb appearance of the mucosa, the lumen becomes less circular in shape, and a projection of the connective tissue of the wall into it is seen. This projection meets the opposite wall of the cavity and appears to convert the single into a double lumen. This double lumen is seen through many sections, and the two cavities undergo a change in shape and size. They are for a considerable length of the tube widely separated from each other, and then they approach one another again and finally fuse into a common cavity. If only the middle sections had been seen, the interpretation put upon the appearance would have been that a double channel was present. By a study of the arrangement of the muscle fibres and from the fact that there is obvious obliquity in the section of the lumina, together with the fact that the single cavity can be traced into the double one and then on to the single one again, it is apparent that this appearance is not due to a double channel or the presence of a diverticulum, but to the tortuosity and folding of a single tube. The same appearances can be produced by twisting and folding a single rubber tube in various directions.

While it is universally admitted that diverticula of the tube lumen do occur, no weight can be attached to the conclusion that their presence has been the etiological factor in any case of tubal gestation unless serial sections have been made.

Other observers have sought to explain the occurrence of tubal gestation by the grafting of the fertilised ovum in a tube, the epithelial lining of which has been altered by a recent catarrhal process. This view merits careful consideration. In the present case there is evidence of recent catarrh in both tubes, but that in the left—the non-pregnant tube—is so slight in degree as almost to be accounted for by post-mortem change. On the right side, however, it is distinctly present, especially on the uterine side of the gestation sac; but the appearances are, in our opinion, such as can be wholly accounted for by the reaction of the tissues subsequent to the implantation of the ovum. On the other hand, the fusion of the villous processes of mucous membrane across the lumen may have played a part in the arrest of the developing ovum in its passage along the tube, a possibility which is strengthened by the fact that such fusion is only present on the uterine side of the ovum. This cribriform structure of the tube lumen may have been produced by a previous salpingitis, although the possibility of its being of congenital origin must not be lost sight of. The amount of recent catarrhal change present is not sufficient to account for it.

*Mode of embedding of Ovum.*—In sections through the middle of the gestation sac the ovum, with its villi, fills up the whole interior of the tube and no lumen is visible. At both extremities of the gestation sac, on the other hand, the lumen is quite intact, and the ovum is seen to be extending not along it, but in the muscular coat of the tube. There is thus evidence that the mode of growth of the ovum is in the tube wall, and that probably it had primarily become embedded there. In sections a little within the limits of the gestation sac the floor of the lumen, where it abuts upon the ovum bed, is formed of a fibrinous layer which completely shuts off all communication between them (Plate IV.). By tracing the sections from this point in towards the centre of the sac the process by which the lumen has been destroyed can be seen (Plates VI. and VIA.). The path of least resistance seems to be in the area just outside the innermost circular muscular fibres of the tube, and along this the villi extend towards each extremity of the tube, and also in a circular direction so as to surround the lumen. At the same time, they extend, although at a slower rate, into the fibrinous layer forming the floor of the lumen, so that in intermediate sections the appearance produced is that of a tube lumen more or less semicircular in shape, with a fibrinous wall towards the bed of the ovum and the rest composed of muscular fibres (Plate VI., Fig. 2). At the sides the villi and trophoblast are seen extending round the lumen for a short distance on either side, but separated from it by the inner muscular fibres. Towards the roof of the cavity the muscular wall is practically intact, except that, just in advance of the trophoblast, there is a loosening and breaking down of the muscle fibres, a point which will be referred to later. Tracing the sections still farther towards the centre, it is found that the lumen gets smaller and smaller owing to the eating up of the limiting muscle by the advancing trophoblast, until in the centre all trace of the original lining of the lumen is lost, and the whole of the interior of the tube is occupied by the ovum and its villi (Plate VIA., Figs. 1 and 2).

The extent to which the villi have penetrated and destroyed the muscular wall of the periphery of the tube varies in different parts. It is greatest towards the side on which the ovum originally embedded itself, and it is here that the rupture occurred which caused the death of the patient. The process by which rupture took place will be more fully described later.

*The reaction of Maternal Tissue to the Growing Ovum.*—The chief interest in this connection lies in the question as to whether there is or is not any decidual formation occurring in other than uterine tissue. As is constantly found, there is present in this case a well-marked decidual lining to the uterine cavity. This can be readily differentiated microscopically into compact and spongy layers, the former consisting of a close aggregation of cells possessing in the main a uniform structure (Plate VII., Fig. 1). The cell wall is irregular in outline, the cell body large and coarsely granular, containing a large nucleus which is usually centrally placed and oval in contour; in it the chromatin network stains deeply and is coarse in structure. Interspersed among these decidual cells are others smaller in size, possessing a nucleus which stains more deeply and appears more homogeneous.

The only other situation in which true decidual formation of this type is found is in the villous processes of the mucous membrane of the pregnant tube on the uterine side of the gestation sac. It has been already noted that towards the site of the implantation of the ovum the villous processes of mucous membrane disappear, with the exception of one which persists almost up to the point where the lumen is destroyed; it is in the connective tissue of this process that the most marked decidual reaction is present. The appearances are practically identical with those found in the uterine decidua. The evidences of a very active young connective tissue-cell formation are present, so that a mass is formed consisting almost entirely of cells which are spindle-shaped, and from their appearance and structure are, without doubt, similar in nature to the decidual cell of the uterus (Plate VII., Fig. 2). They are of the type of young fibroblasts such as are seen in the "process of repair." As in the uterus, there is present another type of cell, smaller in size. This decidual formation is also present in the mucous membrane of the interstitial portion of the pregnant tube. It is entirely absent in the tube of the opposite side, in the ovaries, and in the cellular tissue of the broad ligament.

So far, there is no difficulty in interpreting the appearances presented, but when the wall surrounding the ovum is examined with reference to decidual formation, difficulties arise. There is here no decidual "membrane." There is, however, evidence of cellular reaction identical in nature with that which, in the uterine and tubal mucosa, produces such a membrane. In studying this reaction it is necessary to go beyond the area of trophoblastic invasion, in order to exclude the possibility of confusion between maternal connective tissue cells and isolated trophoblastic fœtal cells.

If the area chosen be such as that towards the base of the tube, where large vessels are present, the following appearances are presented (Plate VIII., Fig. 1). In both artery and vein changes involving all their coats are seen. The endothelial cells of the inner coat are swollen up and increased in number, some lying free inside the lumen of the vessel and others attached loosely to its wall. Underneath these and in the middle coat the connective tissue cells are increased in number and altered in appearance, whilst throughout all the coats red blood corpuscles are interspersed. The muscle of the middle coat is fragmented and disintegrated, and interspersed throughout it these connective tissue cells lie. They possess the structure of the young fibroblast, having a spindle-shaped cell body with striated cytoplasm, an oval nucleus centrally placed, containing a large nucleolus and a coarse chromatin network. In the outer coat these cells are also present, but there is in addition an extravascular accumulation of cells, some of which are of the lymphocyte type, and others which possess the characteristic structure of the mononucleated cell of an "inflammatory exudate"; there is also an occasional polymorphonuclear leucocyte (Plate VIII., Fig. 2). Some of these cells are undoubtedly derived from the endothelium of the perivascular lymph spaces. In fact, all the appearances very closely resemble those met with in the zone of reaction of an infected wound, except that the degree of muscle disintegration is greater.

In the extravascular tissues the young connective tissue cells are also increased in number, and endothelial reaction is present in many of the capillaries.

The type of cell here described is identical with that which goes to form the decidua of the uterine and tubal mucosa, but in the tube wall they are so few in number as never to lead to the formation of a distinct membrane. The reason for this probably is that the tissue in which the reaction is occurring is not a highly cellular almost embryonic structure such as that of the uterine mucous membrane, but one in which a great deal of destruction of muscle must occur before the connective tissue cells are available to take part in the process. This may also explain how it is that the most marked reaction is present in the coats of the vessels, and only to a lesser extent in the general connective tissue of the part.

*The Trophoblast and its Mode of Invasion.*—In sections through the middle of the gestation sac the chorionic vesicle covered with epiblast and containing the embryo in its amnion is well seen. The vesicle is lined with mesoderm, and this has extended out with the epiblastic buds to form villi, many of which are vascularised. The process of vascularisation can be traced as arising locally from the formation of blood capillaries and blood cells. The greater part of the bed of the ovum is occupied by the villi lying in the intervillous spaces. Most of them are covered with two layers of epithelium, Langhans' layer and syncytium. At the limits of the growing ovum the mode of extension of the trophoblast can be well studied, especially at the point where it is working its way round the lumen of the tube.

At this point it is seen that well in advance of the outermost limit of the trophoblastic invasion there is hyperæmia and œdema of the tissues, producing a separation of the muscle fibres. The endothelium of the dilated vessels has, in many cases, become swollen and in places separated. A little nearer the ovum vessels are still more dilated, and there is blood extravasation in the surrounding tissue, in which the œdema is more marked. The muscle fibres are broken up and disintegrating. Still nearer the line of advance, the blood extravasation is increased, and there is commencing fibrin formation. The large connective tissue cells previously described as probably decidual in character are present throughout these areas, but now, in addition to them there are other cells of much the same type, but with a relatively smaller cytoplasm and larger and more deeply staining nucleus. These are fœtal cells derived from Langhans' layer, and they form the advance guard of the invading trophoblast. They are destructive in action, and invade and destroy the vessel walls, and complete the disintegration of muscle. The fibrin deposit is greatly increased in amount. Beyond this fibrin layer and nearer the ovum bed the syncytium is met with for the first time. It is applied to the fibrin-lined spaces and is seen extending along vessel walls. In this situation its structure can be well demonstrated, and its origin from the adjacent villi traced (Plate IX., Figs. 1 and 2). The bud-like processes consist of a finely granular protoplasm, which contains numerous large nuclei with a coarse open chromatin network and large nucleoli.

This is the process of invasion which is seen in all parts of the tube wall, and it would appear as if the destruction of maternal tissue in advance of the actual trophoblastic cells must be due to a biochemical process which prepares the way for them. It is instructive to note that in those places where the reaction of the maternal tissues in the form of endothelial proliferation and increase in number and size of the connective tissue cells is least marked, and where fibrin formation is absent or small in amount, the ovum has penetrated most deeply into the tube wall. It is at such a point that rupture has occurred.

By reference to Plate X., Fig. 1, it will be seen that the tube wall is especially thin at one point, and that here there are situated large thin-walled vessels. It will further be noted that whereas round the rest of the periphery of the ovum there is a fairly thick uniform layer of fibrin, at this point it is almost entirely absent. This area may be called "the area of impending rupture." On examination under higher magnification (Plate X., Fig. 2) practically no reaction on the part of the maternal tissues such as has been noted in the other parts of the tube is present. The endothelial cells are not swollen up or desquamated, and there is no proliferation of the connective tissue cells of the part, but there is an extensive invasion by trophoblastic cells. On tracing this area of the wall through successive sections the mode of production of the rupture can be learned. At a part a little nearer the broad ligament attachment than the very thin area above mentioned there is a large blood sinus in the wall. The wall of this has been destroyed by trophoblast, causing a large hæmorrhage into the ovum bed and an extravasation of blood into the thinned-out wall of the tube (Plate X., Fig. 2). This hæmorrhage, while extensive, has disturbed the relations of the ovum very little. It must, however, have considerably raised the tension inside the tube and also further weakened the wall so that, possibly as a result of muscular contraction of the remainder of the tube wall, the peritoneal coat of the thinned-out portion has given way and an intraperitoneal hæmorrhage has occurred (Plate Xa., Figs. 1 and 2).

Judging from the appearances in the tube wall, more especially at the site of rupture, it would thus appear that the trophoblastic invasion is most marked at those places where there is a failure of response on the part of the maternal tissue, and where fibrin formation has not occurred to any great extent. The resisting power of the fibrin layer is well demonstrated where it forms an effective barrier between the tube lumen and the ovum bed (Plate IV.), thus preventing rupture into the lumen. This fibrin formation together with the reaction which occurs in the endothelial lining of the vessels, the possible migration of endothelial cells through the vessel walls, and the changes of a decidual character in the connective tissue cells, all seem to be for the purpose of, or at least to result in, an arrest in the rate and extent of advance of the fœtal epiblast.

If this view of the decidua is correct, it must be looked upon, not simply as a suitable bed in which the ovum can bury itself, but as a barrier laid down to prevent the too great destructive action of the trophoblast. The absence of any distinct decidual membrane in the tube wall would thus readily explain the frequency of tubal rupture.

A further point of interest may be mentioned, viz., the very large amount of hæmorrhage which occurred as the result of a rupture of such small size in the tube wall and from the opening up of a comparatively small vessel. Spontaneous arrest of the bleeding may have been prevented by the failure of the weakened muscle coat to contract, and there is the further possibility that the coagulability of the blood may be altered by the action of the trophoblast, which seems to possess the power of extending along vessel walls without producing clotting.

*The Embryo and Membranes.*—It is not proposed to enter

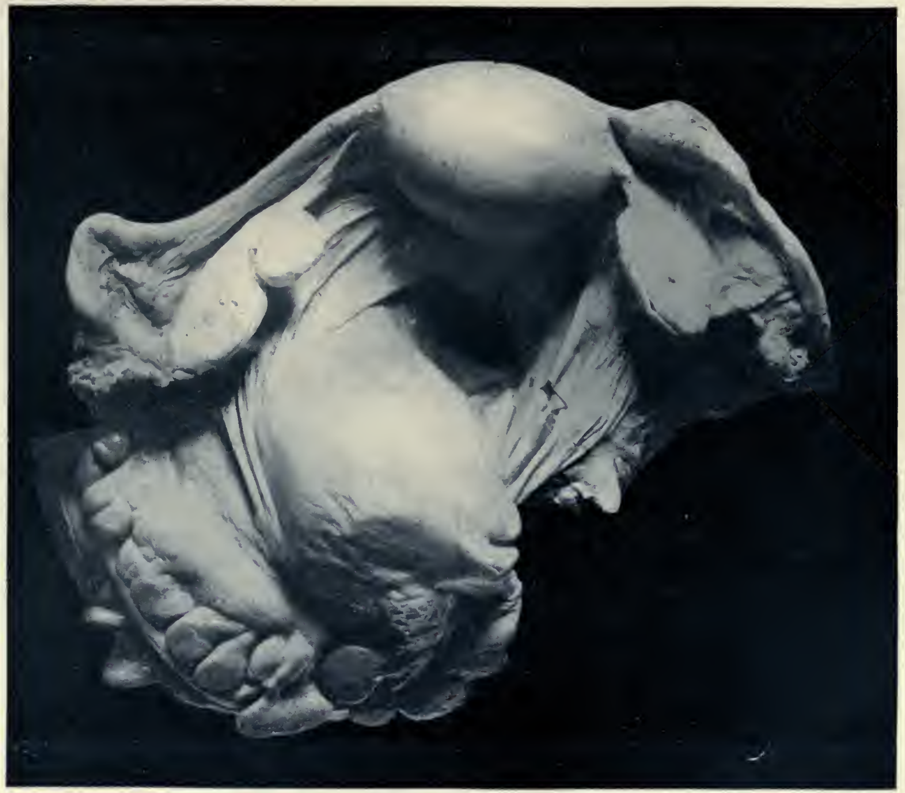
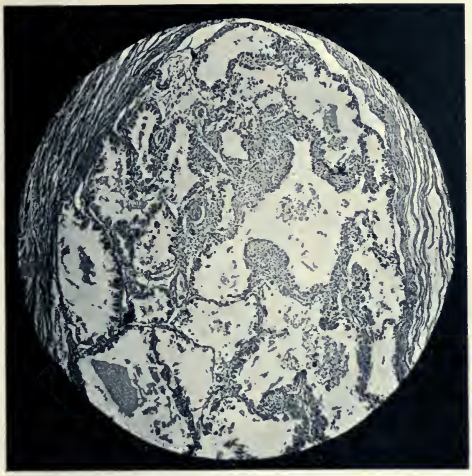


PLATE II.



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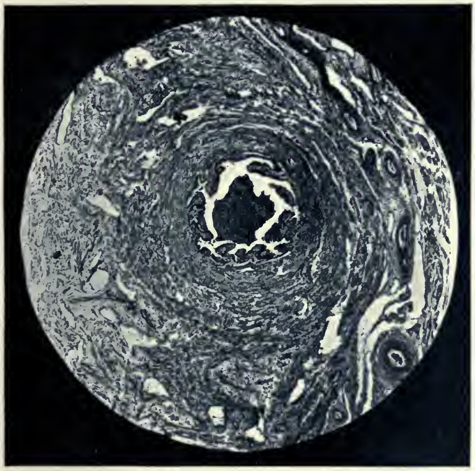


Fig. 2.

PLATE III.

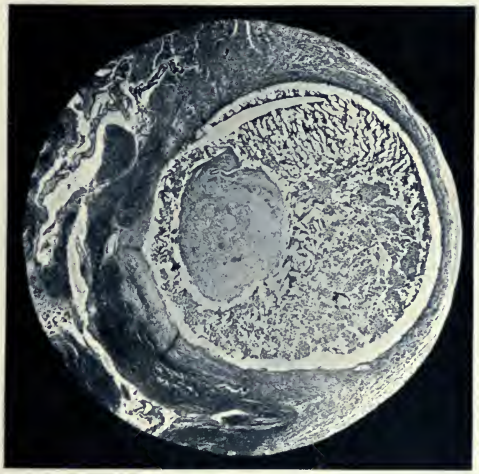


PLATE IV.

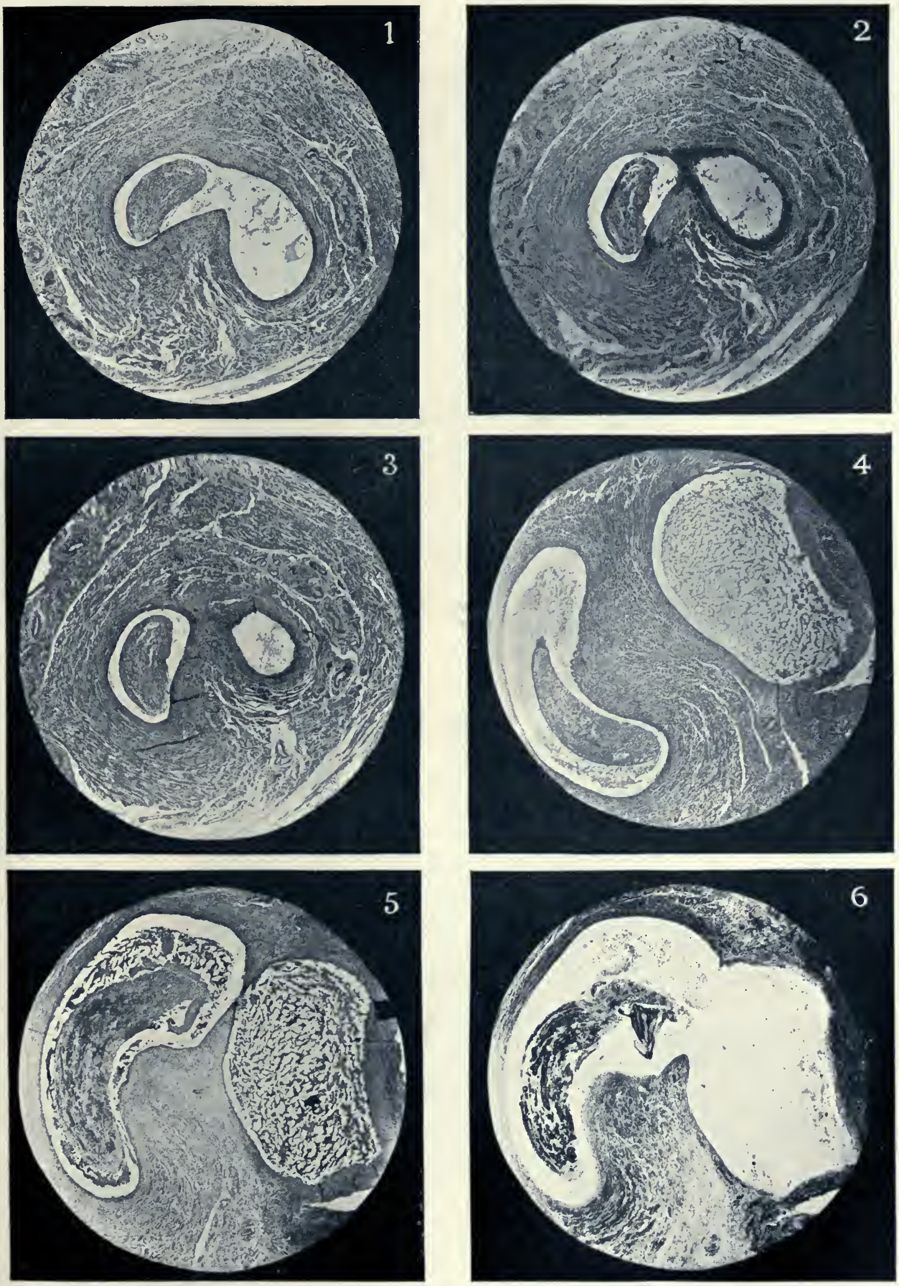
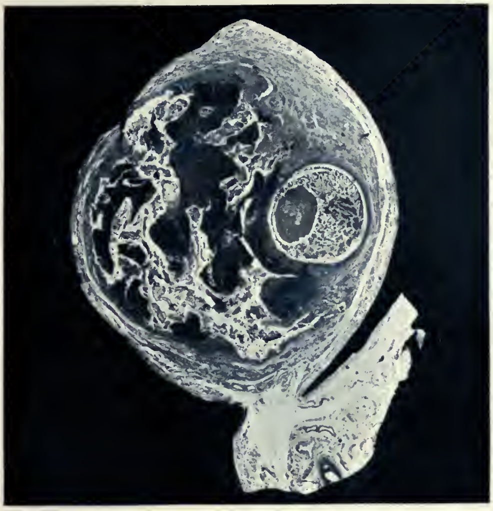


PLATE V.



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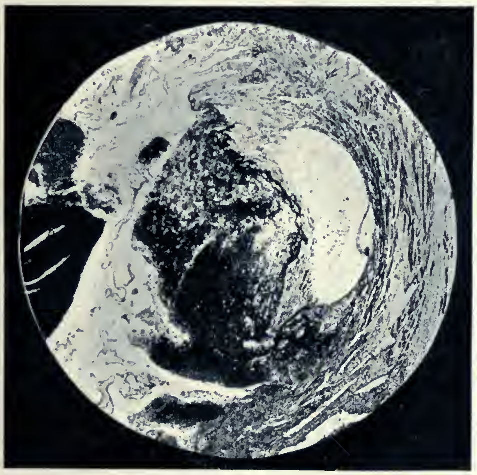
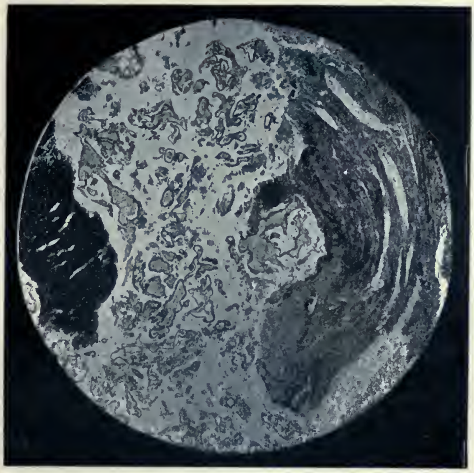


Fig. 2.

PLATE VI.



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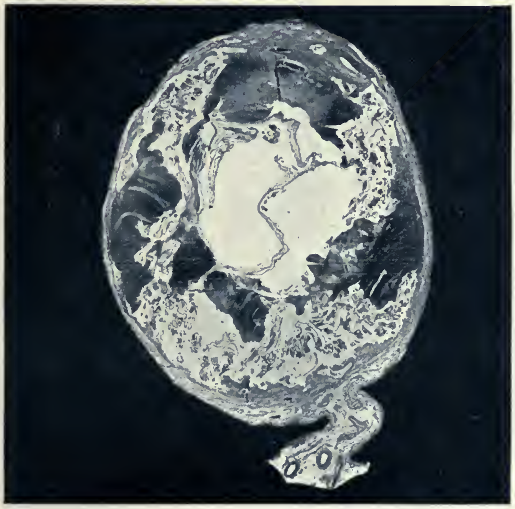
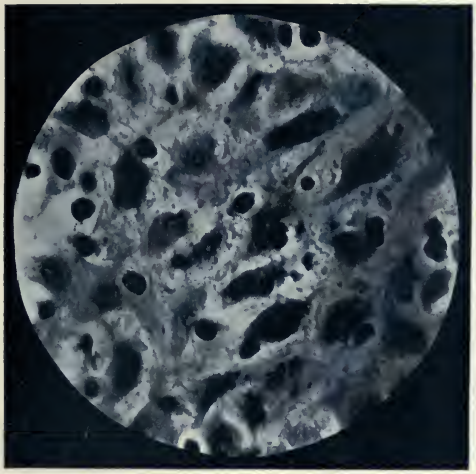


Fig. 2.

PLATE VIa.



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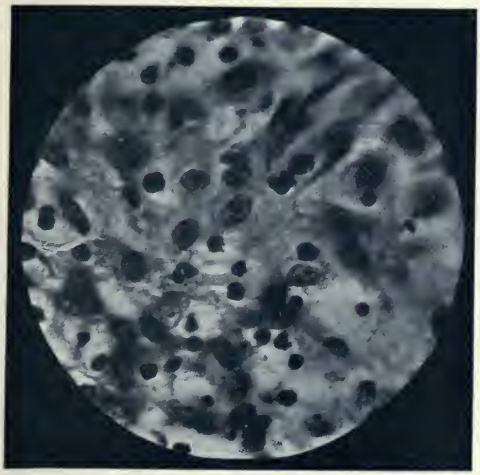
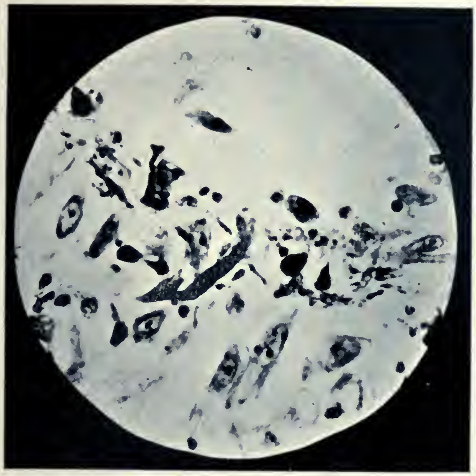


Fig. 2.

PLATE VII.



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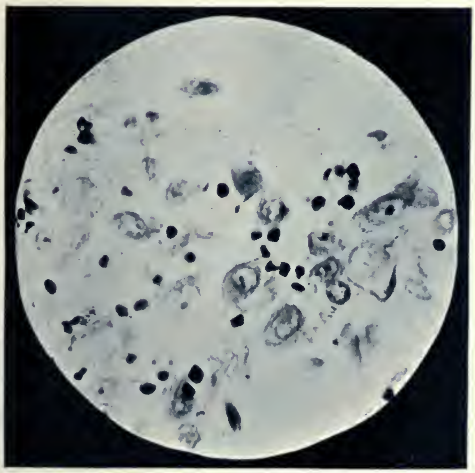
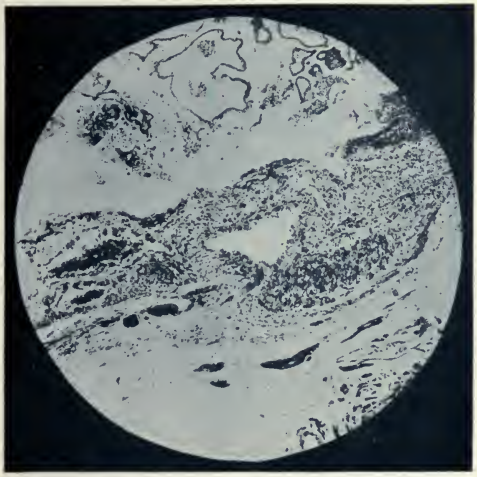


Fig. 2.

PLATE VIIa.



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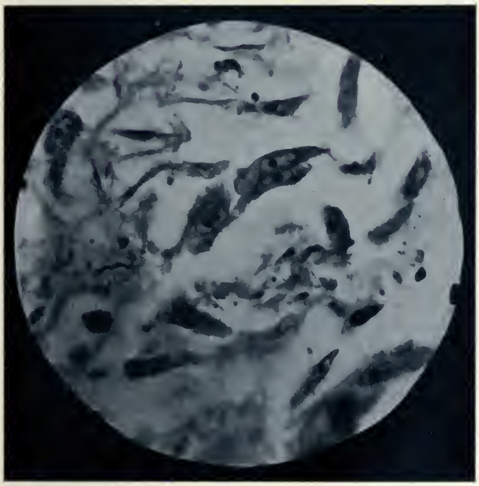
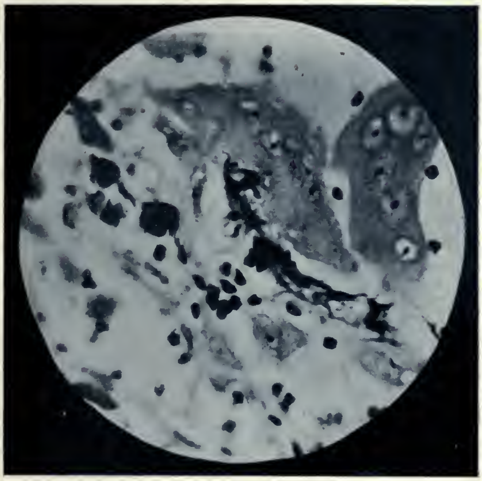


Fig. 2.

PLATE VIII.



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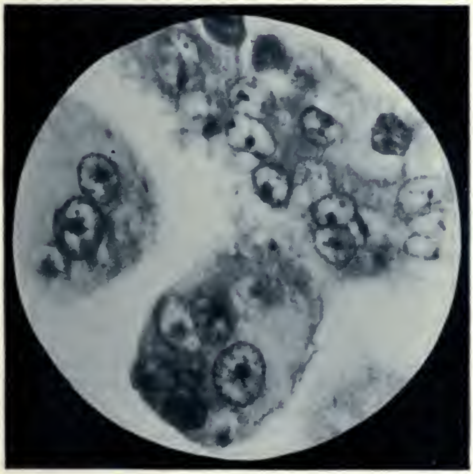

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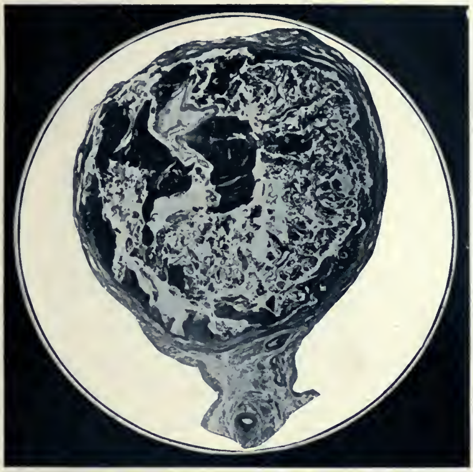
PLATE IX.



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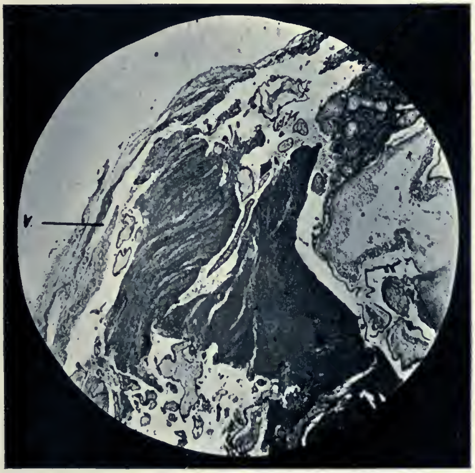
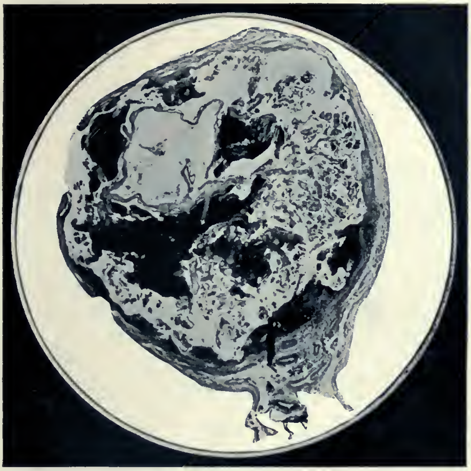


Fig. 2.

PLATE X.



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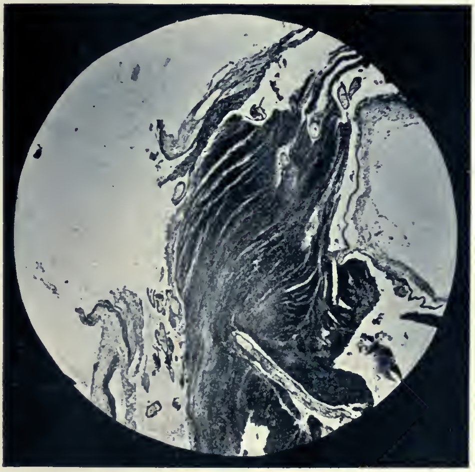

Fig. 2.

PLATE Xa.

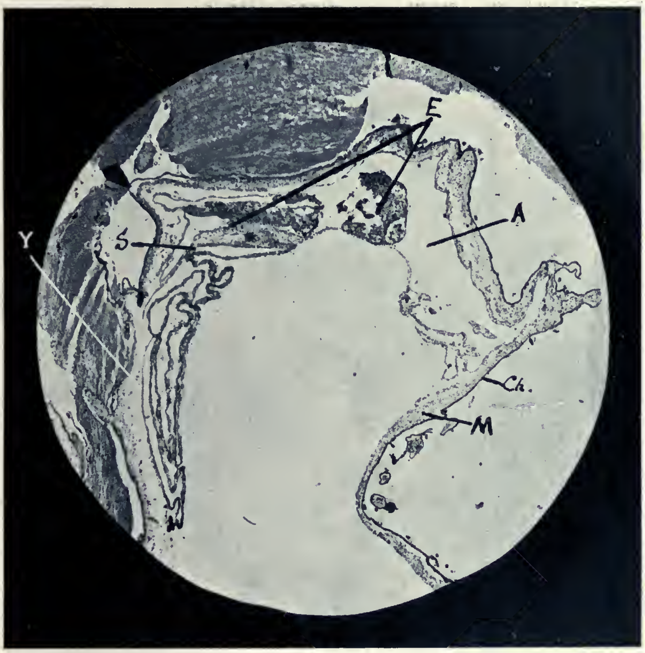

PLATE XI.

into any detailed description of the embryo and its membranes, and we reproduce a micro-photograph (Plate XI.) simply to indicate the extent to which development has proceeded, and in order to give evidence as to the age of the ovum. There is no menstrual history to rely on in fixing this age, and it must be arrived at by comparing the dimensions and development of the embryo with those of other embryos described by various authors.

The measurements of the complete embryo are as follows:—1·9 mm. × ·87 mm. × ·64 mm. These measurements correspond to those ascribed to embryos between the second and the third weeks. It is cut in its long axis, and the relations of the membranes are very well seen in the sections. The amnion is a closed sac of fairly large size inside which the embryo lies. The yolk sac, very much folded, communicates with the ventral aspect, and the belly stalk connects the mesoderm of the chorionic vesicle with the ventral aspect towards the caudal extremity.

The interpretations put upon the different appearances met with in tubal gestation are many and various, but we have purposely abstained from making any reference to the views held by other investigators, as these have been fully set forth in several articles already published.

## DESCRIPTION OF PLATES.

PLATE I. (*Coloured*).—Right side of uterus and right Fallopian tube viewed from the front. Note the minute rupture in centre of the gestation sac.

PLATE II.—The pelvic organs removed *en masse* seen from behind. Note the enlargement of the uterus; the almond-shaped swelling on the right tube and the large size of the right ovary, and the presence, at its junction with the ovarian ligament, of a small fibroma.

PLATE III. Fig. 1.—Transverse section of the lumen of the right tube on uterine side of gestation sac. The villous projections of mucous

membrane are complicated folds united to one another. The epithelial covering is in many places desquamated. The connective tissue cores show dilatation of vessels and an increase in the cellular elements.

Fig. 2.—Transverse section of the right Fallopian tube on the outer side of the gestation sac. Compare with Fig. 1. The mucosa appears healthy. In the cavity is some catarrhal debris.

Plate IV.—Transverse section of lumen in region of developing ovum. The lumen is intact and is separated from the ovum bed by a dense layer of fibrin. Note how the villi are extending round the lumen outside the innermost circular muscle fibres. The interior of the tube is filled with catarrhal debris.

Plate V.—Selected sections of tube on inner side of gestation sac to show how a fictitious appearance of a diverticulum is produced by convolution of the tube. On tracing the tube from Fig. 1 to Fig. 6—from the inner to the outer end of this section of it—it would appear as if a single cavity became a double channel, to re-unite into a single cavity again This can however be seen to be due to obliquity of section.

Plates VI. and VIa.—To show the process of obliteration of the tube lumen by the developing ovum.

Plate VI. Fig. 1.—Transverse section of tube at periphery of ovum. The lumen is intact and filled with catarrhal debris and separated from the ovum bed by a layer of fibrin.

Fig. 2.—Section nearer centre of gestation. The lumen is being encroached upon by the fœtal tissues which are destroying its wall. The fibrin layer is still present. Note the villi extending round lumen external to the inner circular muscle fibres.

Plate VIa. Fig 1.—Shows almost complete disappearance of lumen. Only part of wall left.

Fig. 2.—Transverse section of centre of gestation. No trace of lumen visible. Embryo and its membranes well seen.

Plate VII. and VIIa.—To illustrate decidual formation.

Plate VII. Fig. 1.—Uterine decidua (× 1000). Note the irregularity of the cell outlines, the large, coarsely granular nucleus, and prominent nucleolus. Between the large cells are others of a smaller size, with deeply staining homogeneous nuclei.

Fig. 2.—Decidual tissue from centre of villous process of mucosa of pregnant tube. Note the similarity in appearance of the cells to those of the uterine decidua.

Plate VIIa. Fig. 1.—Section of maternal tissue outside the area of trophoblastic invasion showing alteration in wall of blood-vessel—proliferation and separation of cells of endothelial lining, formation of young connective tissue cells in the extravascular tissue, and the presence amidst the latter of cells probably of endothelial origin.

Fig. 2.—Section of tissue from the zone of trophoblastic invasion showing isolated trophoblastic cells. Note the similarity in appearance of these to decidual cells.

Plate VIII. Fig. 1.—Section of maternal tissue at junction of tube with broad ligament, showing alteration in larger blood-vessels—proliferation of endothelium and disintegration of wall—cellular increase in extravascular tissue and invasion of latter by isolated trophoblastic cells.

Fig. 2.—Section of maternal tissue (×1000). High-power view of wall of blood-vessel seen in Fig. 1, showing formation of young connective tissue cells and presence of cells of endothelial origin—an attempt at decidual formation.

Plate IX. Fig. 1.—Shows syncytial mass applied to maternal tissue and, beyond it, invasion of same by isolated trophoblastic cells.

Fig. 2.—Epiblastic covering of villus showing origin of syncytial bud from outer plasmodial layer, internal to which is the cellular layer of Langhans. The protoplasm of the syncytium is granular and contains large nuclei with coarse chromatin network and darkly stained nucleoli.

Plates X. and Xa.—To illustrate rupture of the tube.

Plate X. Fig. 1.—Transverse section of tube. In the interior note the villi and the chorionic vesicle on section. The wall near the latter is thin and evidently on the point of rupture. There is absence of fibrin formation at this part.

Fig. 2.—Higher power view of "area of impending rupture" as seen in Fig. 1. A blood-vessel (v.) has been opened into and from it bleeding has occurred into the ovum bed.

Plate Xa. Fig. 1.—The rupture in the tube wall. Note the open mouth of the vessel seen in Fig. 2, Plate X.

Fig. 2.—Higher power view of rupture. Note the everted edges of the ruptured wall and the large amount of blood in the tube.

Plate XI.—The embryo and its membranes. The embryo (E) is cut in longitudinal section. It is attached to the mesoderm (M) of the chorionic vesicle by the belly stalk (S) along which the amnion runs for a short distance and then follows the mesoderm to enclose the embryo. The yolk sac (Y) is much folded and can be traced on to the ventral aspect of the embryo.

A., amniotic cavity. Ch., epiblastic covering of chorionic vesicle.

*Sir A. R. Simpson* said the demonstration had been an extremely interesting one and a valuable contribution to the transactions of the Society. Forty years ago nothing had been known of all this, and they could only sit at the feet of the young men and learn.

*Dr Freeland Barbour* thanked the authors for a most magnificent piece of model scientific work. He had been greatly struck with the excellence of the microscopic photographs and reproductions. He could not pass over the clinical fact of hæmorrhage from such a minute opening causing death. It showed the great importance of operating at an early period in such cases. The part that endothelial cells play in decidua was an interesting histological fact. He congratulated Dr Watson on his lucid explanations.

*Dr Haultain* said that the subject was so full of matter that it was impossible to do justice to it as a whole. He could merely touch on one or two interesting points. (1) He noticed that the proximal end of the tube, the end next the uterus, was very deficient in endothelial lining. This deficiency was an argument in favour of Tait's statement, that tubal gestation is due to catarrh and destruction of cilia. The examination of the section from the other side confirmed this. (2) The embedding of the ovum in the uterine wall. There appeared to be deficient decidual reaction, decidua being the first line of defence. The ovum was surrounded by muscle and fibrin on the other aspect. There were many other points as regards this question of fibrin. (3) Hæmorrhage of great extent from a small opening. This was probably due to the fact that an opening in the vessel had been made by the trophoblast. By phagocytic action the trophoblast can penetrate blood-vessels, project into them, and yet prevent coagulation of the blood. (4) Finally he would ask, when, in cases of extra-uterine gestation, should the abdomen not be opened? Probably this woman was thought too far gone for operation, but he thought that in cases of this sort it was never too late to operate until the patient was actually dead. In two cases he had opened the abdomen when the patient was practically dead, almost no pulse, pale, and corpse-like. One died, the other recovered. When a woman bled into her abdomen, it was never too late to operate and give her a chance. He had enjoyed the demonstration extremely.

*Dr Haig Ferguson* said he had enjoyed a most admirable paper. There was one practical point; in this case the gestation appeared to be in the isthmus of the tube, not in the usual position. It struck him that the tube did not rupture from distension but from the action of erosion. He had seen two similar cases, and corroborated Dr Haultain that it was never too late to operate. In one of his cases the tube was not distended at all, but a small vessel was spouting, and the abdomen was full of blood. She made a good recovery from the operation. Usually in such cases the tube bursts from distension, but when situated in the isthmus the action is due to erosion.

*Mr Wade*, replying to *Dr Fordyce* with reference to decidual formation, said that they thought it to be reaction of the tissues due to chemical process. It was to be found in other situations, such as wounds healing, etc. It was to be seen in the tube on the side where rupture occurred. It appeared also in the periphery of the developing ovum, and this slight reaction had materially contributed to rupture. The responsibility lay on the part of the tissue. The young fibroblasts actively dividing appeared to form a live decidual cell. It was impossible to say whether they bore a chemical substance. Mr Wade next dealt with the points raised by Dr Haultain. (1) Catarrh. Catarrh is present, but is probably to be explained by the reaction of the epithelium lining subsequent to the plantation of the ovum. Probably preliminary desquamation is responsible for the implantation. (2) When to operate. In this case the patient died before operation could be carried out. (3) Dr Haig Ferguson's point regarding the cause of rupture. Erosion certainly caused rupture so far. The erosion opened into the blood-vessel when there was extreme peritoneal bleeding, and then rupture took place by burst. Mr Wade thanked the Society for the kindly and appreciative manner in which they had received the paper, and said that it was due to the work of such men as Sir A. R. Simpson that such results were now attainable.

*The President* concluded by testifying the astonishment with which this paper had filled him with regard to the amount of work expended and the clearness of the demonstration. Pathologists must enlighten them as to the liability to dangerous hæmorrhage in such cases. When rupture took place near the uterine end the bleeding was severe, at the fimbriated end it was slower. The only hope lay in immediate operation.

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## MEETING VIII.—JULY 8, 1908.

Professor STEPHENSON, *President, in the Chair.*

I. The following gentleman was elected an Ordinary Fellow of the Society:—David Lawrence Luckhoo, M.D. (Toronto), L.R.C.P.S.E., L.F.P.S.G., New Amsterdam, British Guiana.

II. *Dr Haultain* showed—(*a*) CYSTIC DEGENERATION OF AN ACCESSORY OVARY. The fact that the ovary, removed at the operation and now exhibited, was accessory, was supported by the evidence of some eight or ten doctors who had been present at the operation. Two ovaries, with tubes and ligaments, were still left attached to the uterus after this one's removal. He had not seen a case before. Microscopic sections had shown the structure to be ovarian.

(*b*) RUPTURED OVARIAN CYST, TUBAL DISTENSION, AND FIBROID UTERUS WITH ENDOMETRITIS FUNGOSA POLYPOSA. A woman, aged 30, who had been married for nine months, had, during the last three months, developed a rapidly increasing abdominal tumour attended by great pain. There had been ten weeks of amenorrhœa. On examination the abdomen was found to be distended and very tender. The pelvis was filled with a mass. No absolute diagnosis was possible, but it appeared that the condition was associated with an extra-uterine pregnancy or an ovarian cyst, or else an intra-uterine pregnancy along with an ovarian cyst. The abdomen was opened and was found to contain very purulent fluid, thick in consistence. The tube on the left side was much distended by a cyst which had ruptured through its wall. The uterus was enlarged and was the seat of fibroid tumours, and the other ovary was enlarged also. The operation consisted in clearing out the pelvis, including removal of the uterus. In cutting across the uterus supravaginally, much pultaceous-looking material was found extruding from the cavity. It was considered as probably decidual. The uterus when opened out later was found to be full of the same substance. On microscopic examination it was found that this tissue did not present the characters of decidua, as was expected, but showed a very hypertrophied adenomatous condition of the mucosa. At some points this actually penetrated into the muscular tissue, so that the condition is probably to be regarded as one of latent malignancy, which raises the question as to whether the remaining portion of the cervix should now be removed. This case is the second one of its kind which has occurred in Dr Haultain's experience. In the previous one, which was operated on by supravaginal hysterectomy seven years ago, the patient made a complete recovery. In the present case the occurrence of amenorrhœa was an extraordinary symptom, considering the peculiar fungated condition of the mucosa.

(*c*) STEREOSCOPIC PHOTOGRAPH OF A CASE OF HÆMATOMA OF THE LABIUM, due to rupture into a Bartholinian cyst of what was apparently a large blood-vessel, with the secondary formation of a large hæmatoma of the vulva, larger than a goose's egg.

III. *Dr John M'Gibbon* showed—(*a*) A PAPILLARY CYSTO-CARCINOMA OF THE OVARY, removed from a patient aged 76. It consisted of a cystic portion above and a solid portion below. The cystic portion was slightly adherent, and the solid part densely adherent to the rectum, uterus, and pelvic floor. There was no obvious loss of weight, but the patient showed marked progressive weakness. There was no ascites and no pain.

*Pathological Report by Dr Comrie.*—The tumour is about the size of a large goose egg, with at one side the remains of a smooth-walled cyst of similar size. The surface of the tumour is in general smooth, but presents numerous areas of the size of a sixpence, where papillary masses are apparently stretching the fibrous wall.

In at least three places the surface has given way, and these masses appear of a friable cellular character.

On section, the tumour shows a complete fibrous capsule from which trabeculæ of fibrous tissue run into its substance. Between these the tumour consists almost entirely of a mass of cells, is moderately vascular and very friable; at several places the cellular masses are not closely apposed to the trabeculæ and capsule, but seem to have developed in the interior of a pre-existing cyst.

Microscopically, the tumour contains a fair amount of delicate fibrous tissue, in the interstices of which lie masses of large irregularly shaped cells. At the margin, these cells are very definitely arranged, several rows deep, around thin-walled blood-vessels, and have the appearance of papillæ. Although it is evident that the cellular formation has taken place in the interior of a preformed cyst, it is difficult to form an opinion as to whether the fibrous tissue and blood-vessels are to be regarded merely in the light of supporting structures, or whether the cellular elements are a secondary formation in the vascular walls. In the former case the tumour would correspond to the cysto-carcinoma papilliferum of Ziegler, in the latter to a perithelioma. In either case the condition is rare. It is certainly of a malignant nature, and I hold the former of the two views, as to its histological character, to be the more likely.

(*b*) BILATERAL OVARIAN CYSTS (unilocular), removed from a patient aged 56. The main point of interest lay in the fact that both cysts had twisted pedicles—the larger two twists and the smaller one. One month previous to operation the patient had been seized with severe colicky cramping in the abdomen, without vomiting but with severe diarrhœa. The attack lasted eight hours, and passed off suddenly. This was the only attack previous to operation, and was not associated either with an abnormal pulse or temperature.

IV. *Dr Brewis* showed—(*a*) PHOTOGRAPHS illustrating a case of PSEUDO-HERMAPHRODITISM, with notes.

(*b*) A LARGE FIBROID TUMOUR which grew up amongst the small intestines, being completely invested by them and adherent. There was no record of any difficulty with the bowels, which was remarkable. The tumour was removed with ten feet of bowel, and the patient made an excellent recovery.

(*c*) A LARGE CERVICAL FIBROID, shown to demonstrate a technical point in removal. One of the difficulties in removing the uterus in a case like this was the danger of including the ureter in the ligature when ligating the vessels. To avoid this, the uterus should be split down to the cervix, and then the hand should be put into the cavity, and the tumour should be enucleated in bits from the interior of the cavity, after which subtotal hysterectomy is to be done.

(*d*) UTERUS removed from a patient aged 70. Eighteen years after the menopause she suffered from bleeding. In curetting, a lot of brain-like matter came out, and so the uterus was removed. The result of the microscopical report had not been received, but there was little doubt that the case was one of adeno-carcinoma.

## V. PREGNANCY COMPLICATED BY FIBRO-MYOMATA OF THE UTERUS—A RECORD OF TEN CASES TREATED BY LAPAROTOMY.

By F. W. N. HAULTAIN, M.D., F.R.C.P.E., Gynæcologist, Deaconess Hospital, Edinburgh.

BY a happy provision of nature, uterine fibro-myomata of sufficient import to give rise to symptoms *per se,* are but seldom associated with pregnancy, for there can be no reasonable doubt that their coincidence forms a most serious menace to life.

Curiously, there is a small faction of writers on the subject who consider fibroids to be the result of sterility and not the cause of it, and who must put, therefore, a large premium on marriage. Statistics and practical experience do not to my mind support this contention. From the records of the Royal Infirmary, in 100 cases of fibro-myomata, 37 were single and 63 married; 32 of the married were childless—50 per cent.—which is very striking when compared with the general ratio of sterility, viz., 10 per cent.

My own experience entirely coincides with these figures. Out of 290 cases of uterine fibro-myomata upon which I thought it necessary to perform hysterectomy before the climacteric, 111 were unmarried and 179 married; of the latter, 82 had no children and 97 had among them 222 children. 31 of these had but one child each, and the largest family of any was six. The most outstanding feature, however, was the relative sterility, the youngest child averaging 7 years in those who were not widows; the age of the mothers averaged 41. It would thus appear that women, the victims of small fibroids, frequently become pregnant. This, however, acts materially on the tumour in the majority of cases by permanently increasing its growth, so that they tend to prevent future pregnancy, with a resulting relative sterility.

From these statistics one may legitimately form the conclusions:—

(1) That fibroids occur equally in married and unmarried.

(2) That they predispose to sterility.

(3) That pregnancy, should it occur, excites the growth of the tumour, and thus predisposes to subsequent sterility.

As is well known, fibroids of pathological import, from their site or size, are occasionally associated with pregnancy, but the complication is much less frequent than is supposed. On consulting the case books of the Edinburgh Maternity Hospital, and those of Ward 35 in the Royal Infirmary, their rarity must be conceded, as in the former I find but 7 cases in ten years out of over 4000 cases, while during the same period in the latter's records only 5 cases are mentioned.

From these statistics it may be contended that their coincidence is so trivial as to, in the former, give rise to no difficulty, and in the latter to warrant no advice being sought.

This, from experience, I cannot endorse, for during my tenure of office in the Maternity Hospital although I have on but three occasions seen fibro-myomata larger than a cocoanut, in one of these cases Cæsarean section had to be performed, while another died from eclampsia.

The smaller fibroids, of which I have seen several, were of the innocuous subserous variety, comparable to warts, which gave rise to no symptoms, before, during, or immediately after pregnancy.

The mere presence of a fibro-myoma in the wall of a pregnant uterus cannot be considered a serious complication, but when it is large enough or placed in such a position as to give rise to symptoms of sufficient gravity to warrant the woman seeking advice in the unimpregnated state, there is no doubt in my mind that the coincidence of pregnancy (which fortunately rarely occurs) is undesirable, as it forms a very grave complication. One must clearly differentiate then between the occurrence of pregnancy with innocuous fibroids, and with those which in themselves have given rise to signs and symptoms sufficient to attract notice.

The dangers of the latter may be tabulated as follows:—

(1) Pressure, from their position or size.

(2) Degenerations during pregnancy or after labour.

(3) Interference with pregnancy and labour.

(4) Hæmorrhage during or after expulsion of uterine contents.

(5) Secondary post-partum hæmorrhage.

(6) Readiness to serious septic infection after imperfect expulsion of ovum.

I have had experience of all these complications, but it is my intention to restrict myself to the discussion of ten cases, in which I felt it incumbent to perform laparotomy. They are as follows:—

Case I.—Mrs R., age 35, primipara, after three months' amenorrhœa, complained of very severe intermittent pain and sickness, which had been present for over a fortnight. On examination the uterus was found to reach almost as high as the umbilicus and was unequal in consistence. As the result of sleeplessness and want of nourishment, she was becoming very exhausted, and as her temperature rose nightly to between 101° and 102° F., I decided to remove the tumour, which I attempted; as, however, it was so intimately connected with the uterus, and the bleeding on enucleation was so profuse, I decided to perform supravaginal hysterectomy.

Case II.—Mrs S., age 35, after six months' amenorrhœa, complained of retention of urine and pain and swelling of lower limbs. On examination the pelvis was found to be filled by a large fibroid, which pushed the uterus up into the abdomen and rendered the cervix difficult to reach high above the pubis. I performed laparotomy, and having found the pelvic swelling to be an incarcerated subperitoneal fibroid with a comparatively small attachment to the uterus, I removed it easily by transfixing the pedicle, and subsequently stitching over the stump with Lembert sutures. The pregnancy continued to full time and ended in a natural delivery.

Case III.—Mrs D., (?)-para, last living child seven years old, two miscarriages, complained after six months' amenorrhœa of a large and rapidly increasing abdominal swelling. For the previous week she had had severe intermittent pains and considerable hæmorrhage, and was much exhausted. A large, tender, multinodular abdominal swelling could be felt. I opened the abdomen and performed pan-hysterectomy. The uterus and tumour weighed 18 lbs. The former showed a dilated cervix and much attenuated L.U.S. Labour was well advanced, but expulsion of the ovum impossible.

Case IV.—Mrs L. was admitted into the Maternity Hospital in labour, eight and a half months pregnant. The abdomen was much distended by an irregularly shaped uterus, and the pelvis filled by a large solid tumour. The cervix was entirely beyond reach of the examining finger. I performed Cæsarean section and subsequent pan-hysterectomy. The enucleation of the pelvic tumour, which proved to be a cervical fibroid, was associated with very severe bleeding. The woman died the following day from exhaustion, probably due to the loss of blood.

Case V.—Mrs J., ii.-para, 40, first child ten years old, came under my care suffering from severe menorrhagia, due to fibromyomata. I recommended hysterectomy, but as the patient was bent if possible on having another child, I consented to try and abate the bleeding by curetting, warning her, that in the first instance I thought her chances of pregnancy were very remote, and that if it did take place it would be fraught with danger.

The curettage was fairly successful as regards the hæmorrhage, and she returned to India.

A year later I heard that she had ceased menstruating for eleven months, and had developed a large abdominal swelling, with all the signs of pregnancy. Fœtal movements had, however, ceased at the end of the eighth month, and at the time of the expected confinement she had 36 hours of intense pain, without any dilatation of the cervix. A second bout of severe pain occurred a month later, and lasted 24 hours without any appreciable difference in the condition. She was therefore sent home to be under my care. On arrival, I found an abdominal tumour reaching 5 ins. above the umbilicus, and by pelvic examination several hard nodules in the cervix. I therefore performed laparotomy 362 days after her menstruation had ceased, and found a pregnant uterus with cervical fibroids. The liquor amnii was almost entirely absorbed. From my previous experience with cervical fibroids and pregnancy, I thought it safer to perform supravaginal hysterectomy, from which she made an uninterrupted recovery.

Case VI.—Mrs B., primipara, after four and a half months' amenorrhœa, complained of abdominal swelling and great pain and tenderness over abdomen, with much fever. Tem., 102·6.

Examination revealed a large multinodular abdominal swelling of varying consistency and marked tenderness over one nodule.

Suspecting necrobiosis and pregnancy, I operated without delay, and removed supravaginally the pregnant uterus with multiple fibroids, one of which was distinctly necrobiotic.

I saw this patient with Dr James Ritchie two months previously, and recommended waiting till the child was viable, and if necessary performing Cæsarean section and hysterectomy.

Case VII.—Mrs F., 33, primipara, after three months very irregular vaginal hæmorrhages complained of rapid enlargement of abdomen, retention of urine, and much swelling and pain in lower limbs. A multinodular abdominal tumour of varying consistency was felt reaching to the umbilicus and at the time filling the true pelvic brim.

This I removed by supravaginal hysterectomy.

Case VIII.—Mrs G., age 32, primipara, after three months' amenorrhœa, suddenly developed feverish symptoms—temperature, 102·8—and with slight intermittent abdominal pain expelled a small decidual mass from the vagina. The feverish symptoms continued, and the abdominal pain became constant and remained so for six days. On the seventh day symptoms of acute peritonitis supervened, and on being called in I immediately opened the abdomen, which I found full of pus oozing from a nodule in the uterine wall. I therefore removed the uterus, which was the seat of two suppurating fibroids. Unfortunately, the patient died within twelve hours after. The pus showed infection by the streptococcus pyogenes.

Case IX.—Mrs J., primipara, after three months' amenorrhœa, aborted with such severe bleeding as to require intra-uterine plugging. Three days later the temperature rose to 101·8, and she remained in this feverish condition for four weeks. At the same time severe abdominal pain and distension was complained of. On seeing her in consultation, I decided to open the abdomen, and found a nodulated uterus, surrounded by pus pockets shut off from the general peritoneal cavity by omental and intestinal adhesions. I therefore cleared out the pelvis and drained through the posterior fornix, with a successful result.

The uterus showed a suppurating fibroid, the organism infecting being the staphylococcus.

CASE X.—Mrs J., ii.-para, aborted at the fourth month imperfectly, and the secundines had to be removed with difficulty by scraping. Three days later she commenced to show feverish symptoms, with much offensive discharge. The uterus was much enlarged, irregular in outline, and tender, and on the introduction of the finger a sessile and pulpy mass was felt proceeding into the uterus. As her condition became very grave and signs of peritonitis present, I performed laparotomy with pan-hysterectomy, and thoroughly irrigated and drained the peritoneal cavity, with a most satisfactory result.

The uterus was the seat of numerous fibroid nodules, one of which was sloughing and discharging into the uterine cavity.

From the above series it will be seen that laparotomy was performed four times during pregnancy, twice during labour, three times after expulsion was completed, and once after labour had ceased without expulsion. The last is, I think, unique, and it is difficult to understand how uterine rupture was prevented.

During pregnancy, three of the four cases required operation on account of the pain which was induced by the presence of the growths; in one of these, commencing circulatory degenerative changes in one of the nodules is evident, which doubtless would have gone on to so-called necrobiosis. This is characterised by swelling, œdema, and pigmentary change from hæmatine staining, which gives the tumour the appearance of hepatisation, and is doubtless due to a variety of red infarction from disturbance of the venous return. It is frequently met with in tumours associated with pregnancy, but not necessarily so, as I have twice removed similar conditions where no pregnancy existed. Its main characteristic sign is not merely the pain and rapid growth, but the extreme tenderness of the nodule on pressure. Fever is frequently though not always present.

In the second case, pain was intermittent, and was probably of the nature of uterine contractions, which were unable to expel the contents. These recurred at frequent intervals, rapidly reduced the strength of the patient, and gave rise to severe symptoms, which indicated to me the necessity of immediate removal.

The remaining two cases operated on during pregnancy demanded such treatment, from the severe pressure symptoms complained of.

The three cases of infection of the tumour by organisms are of interest. In that which was fatal, the streptococcus seems to have got access to the growth before expulsion had commenced, while in the others a staphyllococcic infection occurred subsequently. All, however, go to demonstrate the readiness with which fibro-myomata may be infected, and if taken in conjunction with two similar fatal cases I have seen unoperated on, form an important series.

The frequency with which these tumours become infected post partum is the gravest feature of their coincidence with pregnancy. Added to the cases mentioned, I have seen two fatal cases unoperated upon.

This liability to infection is readily explained when one remembers the great increase of the growths, and their great vascularity during pregnancy. After expulsion of the ovum the involuting uterus by its strong retraction seriously interferes with their circulation, so much so indeed, that necrosis and sloughing may occur without infection, so they thus form a ready nidus for the growth and development of pathogenic organisms should infection occur.

Case VIII. is of particular interest, as infection occurred spontaneously, and gave rise to pain and fever, which were present before the expulsion of the decidual mass.

*Diagnosis.*—The diagnosis of the complication was in the majority of cases simple, from the history of amenorrhœa and the detection of excessive enlargement of the uterus, which was irregular in outline and variable in consistency. The absence of amenorrhœa in one case, however, seriously affected the ease of diagnosis, but the mammary changes and varied consistency of the tumour led me to a correct discernment.

Most difficult, however, is the differentiation from these cases of fibro-myomata with exaggerated glandular endometritis which are associated with amenorrhœa, of which I have seen two examples, one of which I have shown to-night. I must say on both these occasions I diagnosed a pregnancy which did not exist.

On the whole, however, it may be said that the diagnosis of pregnancy and fibroids is comparatively simple.

*Prognosis.*—On this question we at once come to debatable ground, and it would be useless to attempt to dwell on the views of different authorities. This divergency of opinion, however, seems to be more apparent than real, the crux of the situation not being duly defined—viz., pregnancy and fibroids generally, as against pregnancy with fibroids whose size and site give rise to symptoms.

In the latter their coincidence is rare, but undoubtedly grave. In a comparatively large experience I have on only three occasions seen pregnancy occur in individuals who have previously known of the presence of the growths. Two of these are cases cited as requiring laparotomy; the third had a large fundal tumour, and had no difficulty with pregnancy or labour beyond a somewhat severe puerperal bleeding.

In this connection the question of marriage in women with known fibroids is one of importance. Fortunately, from the usually late development of these growths one is seldom consulted on this question, as the individual is somewhat *passée* so far as bridal developments are concerned; still, exceptions do occur. Should they do so, I certainly would be no partisan to negative the proposal,—mainly from the improbability of pregnancy occurring. I would, however, warn the patient of the seriousness of the off chance, and leave it for her own decision. In other words, a woman with a known fibro-myoma is better single, but if married, safer sterile.

As I have already stated, I have had two deaths in the ten cases operated on. One from septic peritonitis before the operation was undertaken, and the other from hæmorrhage after enucleation of a large cervical fibroid at term. This in itself forms the large mortality of 20 per cent., but when to this is added two fatalities seen unoperated on, the serious nature of the complication is materially increased.

Speaking generally, small innocuous fibroids (which, according to statistics from post-mortem examinations, occur in 20 per cent. of women) are of no moment, but the small residue which in themselves give rise to symptoms must be considered of very anxious import when associated with the gravid state.

*Treatment.*—The treatment of cases of pregnancy complicated by fibroids is a subject of the greatest importance, and necessarily must vary with each individual case. Generally, it may be said to be primarily expectant in every instance, as according to many observers tumours of a size and position, which at first would seem to make it appear unlikely that pregnancy and labour could be safely terminated, have been shown to have given rise to no untoward results whatever. Of these, however, I have no such happy personal experience, although in two of the cases previously described I had the possible opportunity of having it, as the patients were under my care before urgent symptoms supervened.

Management on these lines must only, however, be adopted, if it can be shown that by conserving the life of the child the risk to the mother is not seriously increased. This can, in the majority of cases, be answered in the affirmative from the following reasons:—

1. The chance of no complications occurring.
2. Should complications arise they can usually be treated successfully.
3. The risk of operative treatment after the viability of the child though increased is not sufficiently so as to warrant early interference.
4. The dangers during and after expulsion appear to be as great in the early as in the later months of pregnancy.

The lines of active treatment at our disposal are the induction of abortion, myomectomy, and hysterectomy. The first of these is to be entirely deprecated and should never be resorted to. This assertion I make for two cogent reasons, first, the dangers of abortion are very great, as evidenced by the cases cited, and in my experience supplemented by two other fatal cases from septicæmia. Further, should fortunately the woman survive the risks of abortion, it is almost certain she will have to undergo further treatment by myomectomy or hysterectomy, which could have been as safely done with the uterus gravid as after it had been emptied.

By the induction of abortion, therefore, the patient has to run the double risk of the abortion and subsequent operation, of which the former is by far the greater.

From a conservative standpoint, myomectomy, when practicable, is the ideal treatment; but in the majority of cases it is unfortunately unsuitable, from the multiplicity of the growths, their degenerations and sessile character.

In the treatment of fibroids generally, myomectomy is shown by statistics to be more dangerous than hysterectomy. If this be so, it is much increased in the gravid uterus, from the increased vascularity, which must necessarily tend to increased bleeding, not to mention the risks of subsequent abortion. With a solitary growth, however, giving reasonable hope of ready enucleation, myomectomy should be attempted in the majority of cases. More frequently, however, hysterectomy will form the most satisfactory and safe operation.

During pregnancy, the operation is more easily performed than usual, owing to the softness of the surrounding tissues and the laxity of the peritoneum, and seems to be associated with little more risk than when undertaken in the non-gravid state, although from increased vascularity hæmorrhage may prove troublesome to control, particularly in the enucleation of intraligamentary and cervical growths.

The important points which may be gleaned from what has been said may be summed up in the following conclusions:—

1. Fibroids tend towards sterility.
2. The association of pregnancy and fibroids, in themselves sufficient to give rise to symptoms, is an extremely anxious complication.
3. That treatment in all cases should be expectant, but on complications arising myomectomy or hysterectomy should be adopted.

In bringing the important subject before the Society, I am well aware I am treading on debatable ground, but its importance has, I feel, warranted me bringing forward my experience as a text for a general review upon it. Many individual cases have been described and specimens shown, but general discussions on this complication are rare.

My experience may have been exceptional, and is so when compared with that of Champneys, Spencer, and others,[1] who have seldom found fibroids and pregnancy of anxious moment.

From this experience I may have taken too pessimistic a view of the subject, and this has prompted me to court the discussion of the Fellows; as there can be little doubt that the rapid advance of abdominal surgery has entirely changed the treatment of these growths within recent years, and the complication of fibroids and pregnancy, though undoubtedly anxious, is no longer associated with the huge mortality of twenty years ago.

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*Dr Brewis* said he had much pleasure in expressing what he felt sure was the opinion of the Society, that the paper they had just listened to was one of the greatest value. They had all enjoyed and benefited from it. What Dr Haultain had to say about fibroids was of interest not only to that Society, but to the whole gynæcological world. The subject bristled with interesting points, many of which were of great importance. They could not regard lightly the condition of any woman whose pregnancy was complicated by fibroids. If the tumour was high placed, the patient might pass through labour simply, but even in those cases there was the danger of necrobiosis and sepsis. If the tumour were low placed, the child's descent might be obstructed, and operation be necessary. In his experience the general symptom complained of was pain, due, he thought, either (*a*) to degenerative changes in the tumour or (*b*) to pressure. Only in one case had he been able to alleviate the pain otherwise than by operation, and that was by an abdominal belt. Dr Haultain had said there was no harm in waiting until the child was viable, and that he had always done this; but he himself in one case had been unable to wait, owing to the intense pain at six months and threatened ureter obstruction. The extreme rapidity of the growth of the tumour was another interesting point. In one of his cases the tumour filled the whole abdomen in three months. In January there was no pain, but in March the tumour filled the abdomen. He had never found the red degeneration spoken of by Bland Sutton, but generally cystic degeneration. In cases where operation is required, subtotal hysterectomy or some modification of it should be performed. He had seen one very interesting case of fibroid tumour complicating a six months' pregnancy. The tumour, about the size of a fœtal head, was felt in the left iliac fossa one day. Next day it was felt in the right iliac fossa. The diagnosis was puzzling. He thought it must be an ovarian tumour with a long pedicle. An incision was made to explore, and the tumour was found on the right side, the left ovary and tube presenting on opening into the peritoneal cavity. Axial rotation had occurred. Dr Haultain was to be congratulated on the success of his cases, the majority of which had been very serious.

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[1] *Proceedings, Royal Society of Medicine*, May 1908.

*Dr Lackie* thought there could be little doubt that fibroids caused sterility. The mere fact that fibroids were common, and such tumours complicated with pregnancy were rare, seemed to point to this. He had had an experience of fibroids complicated with pregnancy which Dr Haultain had not touched on. A woman came into Edinburgh to be confined, and on examination a large fibroid was discovered in the pouch of Douglas. The os could just be felt. While preparing for Cæsarean section, the patient went into premature labour at eight and a half months, and in the first stage the obstruction seemed complete, but the tumour rose from the pelvis and became abdominal. When the child was born it fell again into the pouch of Douglas, filling the pelvis and rendering the expulsion of the placenta almost impossible. He was glad to find Dr

Haultain deprecated the induction of abortion in these cases. He had only once tried this procedure, and the only part of the fœtus that came away was one of the legs. It was in these very cases where obstruction was most complete that abortion was tried, and they were the very cases in which it was least likely to be successful.

*Dr Barbour* said that those who had read Dr Haultain's monograph on fibroid tumours of the cervix in Clifford Allbutt and Playfair's *System of Gynæcology* had looked forward with interest to this paper, and had not been disappointed. The paper dealt with more than had been promised. There was the important question of fibroid tumours in the early puerperium. There was also the most interesting case of pregnancy for 364 days. Could this be called pregnancy, and, if so, how long was it possible for pregnancy to last? The question of necrobiosis in pregnancy interested him greatly, and the tendency of pregnancy to increase the growth of the tumour. He thought there could be no doubt that in those cases operative procedure was the only proper method of treatment.

*The President* thought that Dr Haultain's very valuable paper made a fitting ending to their session. It was, perhaps, the most valuable paper contributed. The subject was so extensive that it was difficult to take up the points in detail. His experience went far back to the times when they did not think of performing operations except the induction of abortion. He had consulted Sir T. Keith on a case at a time when hysterectomy was not to be considered. They passed a sound and the case ended very favourably. Abortion came on, but it was four days before the placenta came away. The patient did well, but suffered much from fibroids afterwards. In another case he had passed a sound and the child was born, but they were unable to reach the placenta. Febrile symptoms unfortunately set in, and, in spite of all that could be done, the patient died. In another case he had performed Cæsarean section at full term with a large fibroid tumour filling the whole pelvis. This was easily raised up and the child delivered with forceps. The patient did well. He would never now perform abortion, and would question whether pregnancy should not be allowed to go on and perform Cæsarean section. He thought this turned upon the growth of the tumour. In certain cases it was possible to do this, but each case must be studied on its own merits. He congratulated the Society on having drawn forth such a paper.

*Dr Haultain* expressed his thanks for the manner in which his paper had been received, and said he was glad to have got confirmation of his opinion of the gravity of this combination. He had been much struck with the opinion of specialists, expressed at the meeting of the Obstetrical section of the Royal Society of Medicine in London a few months before, that fibroid tumours were of little importance as complications of pregnancy. This certainly was not his experience. He spoke of the growth of fibroids being hindered by the presence of pregnancy, and recapitulated with regard to treatment. The general treatment in pregnancy was to wait until the child was viable, and then to give the patient a further chance until she goes into labour. Then, when are you to interfere? Is it not better to do Cæsarean section? Each case must be decided upon by itself. There were many other points it was not possible to touch upon.

# APPENDIX.

## ON THE CARBOHYDRATE METABOLISM OF THE FŒTUS.

By James Lochhead, M.D.

Read 10th July 1907. The publication was delayed till the investigations were completed. The later results are included in the paper, "The Glycogenic Changes in the Placenta and the Fœtus of the Pregnant Rabbit; a Contribution to the Chemistry of Growth," Lochhead and Cramer, *Proc. Roy. Soc.*, B., vol. 80, p. 263, 1908; and in "On the Transmission of Nitrogenous Compounds from Mother to Fœtus," at page 120 of the present volume.

Mr President and Fellows,—I intend to-night to give a short account of one branch of the investigation into fœtal nutrition which I have recently carried out under the direction of Dr Cramer. Till a few years ago, no attempt was made to study the chemical processes at work in the mother and the fœtus during the period of gestation. But lately the work of Zacharjewski, Magnus-Lévy, and others on the metabolism of pregnancy, of Heape and Marshall on the menstrual cycle, of Fränkel on the corpus luteum, and of Starling on the mammary hypertrophy and secretion, indicates that the subject of reproduction has at last attracted the attention of physiologists to a degree which augurs well for the future.

The subject of fœtal nutrition naturally enough has shared in the general advance, and I hope to have the opportunity of giving an account of some of these investigations on a future occasion. To-night I intend to refer only to the carbohydrate metabolism of the fœtus—the branch which above all others receives scant treatment even in the largest text-books, and for that reason may possibly be of greater interest.

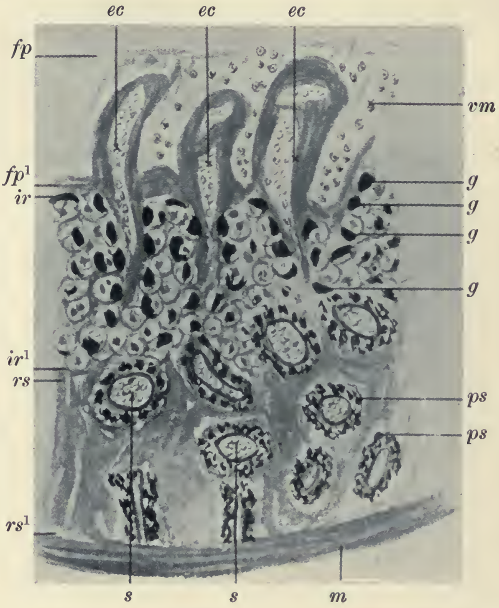
Of the carbohydrates of the fœtus, glycogen has always received particular attention owing to its wide distribution. It is not, as in the adult, confined practically to the liver and muscles, but is found in addition in the cells of all or nearly all the other organs of the fœtal body. It is also present in the placentæ of all animals yet investigated, but in widely varying amounts. Thus in ruminants, where it is commonly stated by histologists to be altogether absent, small amounts of glycogen can be extracted from the cotyledons by chemical methods. In carnivora it is greater in amount, and collectsat the margin of the zonary placenta. It is also present in the human placenta, but its exact distribution has not yet been determined. Finally, in rodents such as rabbits, guinea-pigs, and mice, there is a large store of placental glycogen.

There have been several investigations into the glycogen of the rabbit's placenta. Of these the most recent and the most complete is that of Chipman, carried out in the Laboratory of the College of Physicians here. I have found his work of the utmost value, and have depended largely on it for the explanation of my results. But all the researches have been histological, and any attempt by such means to trace the quantitative changes can at the best be only approximate. Hence it seemed to be of importance to determine by chemical methods the amounts of placental glycogen at the different stages of pregnancy, and to find out whether any relationship existed between it and the glycogen of the fœtus.

For the work rabbits were used because the period of gestation is short, and an age-series can therefore be obtained without great trouble; in them too the placentæ and fœtuses can be obtained absolutely fresh—a point of the utmost importance when we remember how quickly glycogen disappears after death.

Diagram I.—Representation of Rabbit's Placenta (from Chipman).

(12 *days' Gestation, showing Glycogen.*)



Drawing giving the general distribution of glycogen at this date of gestation. The thickness of the entire placenta is shown from the muscular wall of the uterine cornu below to the fœtal surface above. The fœtal placenta shows no glycogen.

*fp*, *fp*1, fœtal placenta; *ir*, *ir*1, intermediary region of maternal placenta; *rs*, *rs*1, region of uterine sinuses of maternal placenta; *m*, muscular wall; *s*, *s*, uterine sinuses; *ec*, *ec*, *ec*, "ectoplacental columns," the axes of which are hollow and filled with maternal blood; *vm*, vascular mesoderm (nucleated fœtal blood); *g*, *g*, *g*, *g*, glycogen-granules in the multinucleate decidual cells; *ps*, *ps*, perivascular sheaths of uninucleate decidual cells rich in glycogen.

The date at which the rabbits were served was noted in each case, and the animals were killed at different stages of pregnancy. Thus an age-series was obtained from the eighteenth day to the end of gestation, the interval between each two being as nearly as possible twenty-four hours. Immediately after death, the gravid uterus was excised, the various sacs were opened and the fœtuses extracted. The maternal and fœtal parts of the placenta were gently pulled asunder, and each was analysed separately. Next each fœtus was opened and the liver extracted, care being taken not to include any of the intestinal wall, which is known to contain glycogen.

The four different sets of tissues—maternal placentæ, fœtal placentæ, fœtal livers, and remainders of fœtal bodies were then weighed and at once treated for the extraction of their glycogen. The results are set down in the diagrams which I have had put up. The number of fœtuses varied from three to six or seven, and it was necessary for purposes of comparison to give the results per placenta and per fœtus.

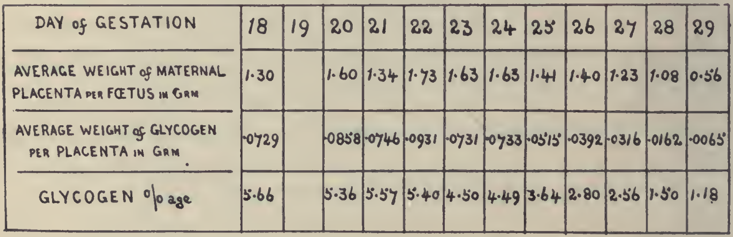
But before going on to discuss the results, I would draw attention to this diagrammatic representation of the rabbit's placenta (Diagram I.) copied from Chipman's monograph. In the lower part, we can recognise three regions, and each forms a glycogenic area: (1) next the uterine muscle, the zone of separation of the placenta. The glycogen is contained in the decidual cells surrounding the sinuses, and there is still an appreciable part remaining here at the end of pregnancy.

(2) The region of the uterine sinuses: here again the glycogen lies in the decidual cells, but, unlike the last, it has probably all disappeared before the end of gestation.

(3) A part which extends up as a series of peninsulæ among the fœtal columns.

These columns are analogous to the villi of the human placenta, and like them have a covering of syncytium derived from the fœtal ectoderm. In shape they are like test-tubes, sections of which are shown in the diagram, closed above and open below, and enveloping the projections of maternal tissue which I have just referred to. Here again in the promontories, glycogen is present in the decidual cells, and it again disappears before the end of pregnancy.

When the two parts of the placenta are mechanically separated, these promontories, or parts of them, are broken off and are left attached to the fœtal tubules, and the glycogen of the fœtal placenta is not, as might appear at first sight, actually in it, for no glycogen has been demonstrated in these fœtal tissues at any time during pregnancy, but really belongs to the maternal placenta. It is the part most intimately related to the fœtal tubules, and for this reason it was estimated separately.



| DAY of GESTATION | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AVERAGE WEIGHT of MATERNAL PLACENTA PER FŒTUS IN GRM | 1·30 | | 1·60 | 1·34 | 1·73 | 1·63 | 1·63 | 1·41 | 1·40 | 1·23 | 1·08 | 0·56 |
| AVERAGE WEIGHT of GLYCOGEN PER PLACENTA IN GRM | ·0729 | | ·0858 | ·0746 | ·0931 | ·0731 | ·0733 | ·0515 | ·0392 | ·0316 | ·0162 | ·0065 |
| GLYCOGEN %age | 5·66 | | 5·36 | 5·57 | 5·40 | 4·50 | 4·49 | 3·64 | 2·80 | 2·56 | 1·50 | 1·18 |

Diagram II.—Glycogen of Maternal Placenta (*A*—Distal Part).

Diagram II. shows the results of the analyses of the maternal placenta. The first line indicates the stage in pregnancy at which the placenta was obtained, and we see that the series is complete from the eighteenth day to the day before labour, with the exception of one gap at the nineteenth day.

The second line shows the average weight of the maternal placenta. It shows a progressive decrease during the last week of pregnancy.

The third line shows the amount of glycogen per placenta at each date, and the last line the percentage amount.

On looking at the figures of the fourth line, we see that the placenta has a considerable percentage of glycogen in every case. Indeed in the earlier cases it is quite comparable to the percentage obtained in a healthy adult rabbit's liver. Till the twenty-second day the percentage remains fairly constant, and then there is a continuous fall from 5·5 per cent. to little over 1 per cent. at the end. The glycogen found on the twenty-ninth day, about 6 mg. per placenta, is, as already stated, probably all situated at the zone of separation, and is not available for the fœtus.

Diagram III. show the results of analyses of the fœtal placenta. The various lines indicate as before the day of gestation, the weight (here there is no decrease in weight in the last week as in the maternal placenta), the absolute amount of glycogen, and the percentage amount. If we look at the third line, which, as mentioned above, indicates that fraction of the glycogen of the maternal placenta which is most directly available for the fœtus, we see a progressive decrease resembling that in the last. There is a specially big drop at the twenty-fifth day, and on the twenty-ninth day there is no glycogen left in this part of the placenta.

| DAY of GESTATION | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AVERAGE WEIGHT of FŒTAL PLACENTA PER FŒTUS IN GRM. | 1·03 | | 1·40 | 1·90 | 2·30 | 2·38 | 2·67 | 2·83 | 1·90 | 3·93 | 2·70 | 2·72 |
| AVERAGE WEIGHT of GLYCOGEN PER FŒTAL PLACENTA IN GRM | ·0072 | | ·0102 | ·0110 | ·0082 | ·0062 | ·0043 | ·0017 | ·0011 | ·0016 | ·0008 | 0 |
| GLYCOGEN %AGE | 0·70 | | 0·72 | 0·60 | 0·36 | 0·26 | 0·16 | 0·06 | 0·06 | 0·04 | 0·028 | 0 |

Diagram III.—Glycogen of Maternal Placenta (*B*—Proximal Part).

The total placental glycogen may be obtained by adding together the third lines of the Diagrams II. and III.

Diagram IV. gives the results of the analyses of the fœtal liver. Here we enter on a debated subject. Bernard long ago taught that the fœtal liver contains no glycogen in the first half of intra-uterine life, and only after that assumes its adult function of storing glycogen for the organism. Pflüger, on the other hand, states that the liver does contain glycogen in the first half of intra-uterine life, and he says there is no evidence for saying that the fœtal liver does not possess its adult function. It was owing to this unsettled nature of the question that I investigated the fœtal livers separately, and I think I have reached a definite result. The method which I adopted is the only possible way to solve the problem, namely, to analyse an age-series.

| DAY OF GESTATION | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AVERAGE WEIGHT OF FŒTAL LIVER IN GRM. | ·09 | | ·42 | ·54 | ·68 | ·70 | 1·0 | 2·03 | 0·74 | 2·67 | 2·07 | 2·11 |
| AVERAGE WEIGHT OF GLYCOGEN PER LIVER IN GRM | TRACE | | ·0002 | ·0003 | ·0006 | ·0013 | ·0026 | ·0116 | ·0016 | ·0392 | ·0703 | ·0536 |
| GLYCOGEN %AGE | 0· – | | 0·04 | 0·06 | 0·09 | 0·19 | 0·25 | 0·57 | 0·21 | 1·47 | 3·40 | 2·54 |

Diagram IV.—Glycogen of Fœtal Liver.

| DAY OF GESTATION | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AVERAGE WEIGHT OF REST OF FŒTAL BODY IN GRM | 0·8 | | 1·90 | 2·74 | 3·45 | 6·50 | 8·75 | 18·20 | 10·50 | 30·17 | 30·00 | 24·56 |
| AVERAGE WEIGHT OF GLYCOGEN PER FŒTUS IN GRM | ·0018 | | ·0048 | ·0077 | ·0097 | ·0190 | ·0320 | ·0692 | ·0241 | ·1026 | ·1314 | ·0663 |
| GLYCOGEN %AGE | 0·23 | | 0·25 | 0·28 | 0·28 | 0·29 | 0·37 | 0·37 | 0·23 | 0·34 | 0·44 | 0·27 |

Diagram V.—Glycogen of Rest of Fœtal Body.

In the early stages we see that the fœtal liver contains only the merest traces of glycogen. I may say that Chipman discovered none histologically before the twenty-second day, but there is a small amount present at least four days before that. Later on in pregnancy the amount rapidly rises, till at the end about one-half of the total fœtal glycogen is stored in the liver.

The chief point to note is this: Before the twenty-fifth day the *percentage* amount of glycogen in the liver is below the *percentage* amount in the whole of the rest of the fœtal body (Diag. V.), and it is obviously absurd to talk of it as storing glycogen for the fœtal organism when it has not even its own proportion. Hence, I think we may conclude that, although the fœtal liver contains glycogen earlier than was supposed, yet it does not assume its adult function till pregnancy is somewhat advanced—the twenty-fifth day in the rabbit.

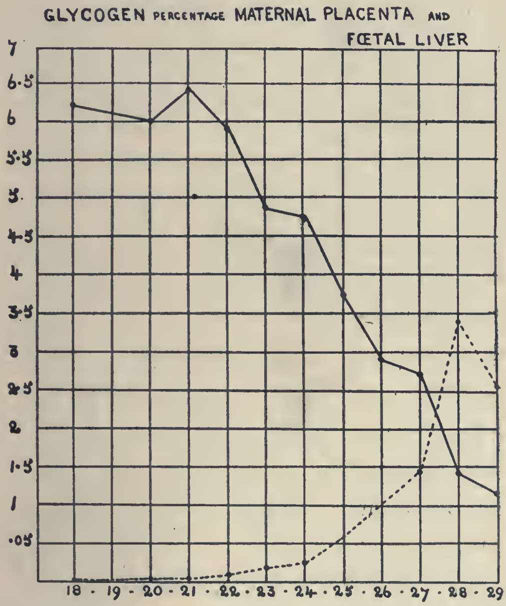


Diagram VI.—Relation between Glycogen of Maternal Placenta and Fœtal Liver.

Diagram VI. shows the relation between the glycogen of the maternal placenta and the fœtal liver. It depicts graphically the gradual decrease in the placental glycogen and the increase in that of the fœtal liver, and affords strong evidence that the maternal placenta performs the glycogenic function for the fœtus until the fœtal liver acquires it.

Diagram V. represents the results of the analysis of the remainder of the fœtal bodies. I need not delay at it, but pass on to the next. Here in Diagram VII. the total fœtal glycogen at each day of gestation is depicted in percentages. In the other the fœtal weight is given. The curves rise together and fall together, and indicate the close relationship that exists between glycogen percentage and energy of growth. This is another disputed point which no attempt had previously been made to settle in the only reasonable way—by comparison in a complete age-series.

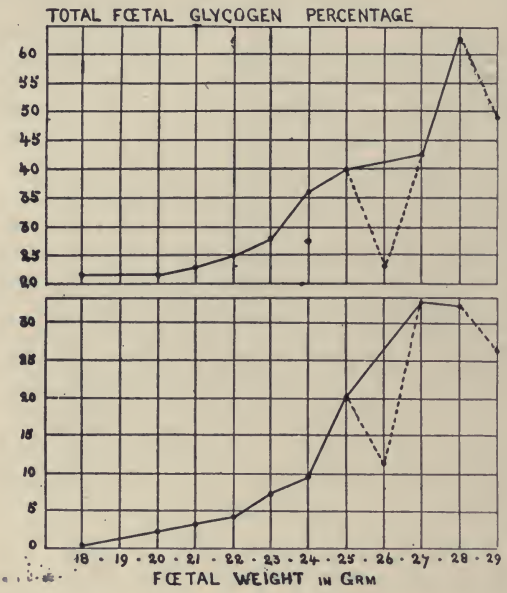


Diagram VII.—Relation between Glycogen Percentage and Fœtal Growth.

## DIET.

Finally, I found that by alterations in diet I could effect no change in the glycogen percentages of these four tissues. Hence we may conclude that the carbohydrate for the fœtus is not directly obtained from that of the food. This is part of the general question as to whether the material for the fœtus comes from the food or from the mother's tissues. Very little definite evidence has yet been obtained on either side, but the constancy of the glycogen percentages in spite of variations in diet seems to show quite definitely that in this particular the source is the maternal tissues and not the food directly. So much for the results.

## GENERAL REMARKS.

No attempt has yet been made, so far as I am aware, to write a general account of the carbohydrate metabolism in the fœtus, and I feel somewhat chary of saying much. But, I think the broad outlines may be sketched in without much chance of error.

In the first place, there can be no doubt that the placental glycogen is destined for the fœtus. The close relationship between its gradual decrease here and its increase in the fœtus is, I think, conclusive of this; but if this evidence is not sufficient, the histological relations remove any doubt. For the glycogen-containing promontories of maternal tissue are enveloped by the fœtal tubules, and gradually absorbed by them.

At the same time it is difficult to understand why, if current ideas are correct, such a store of carbohydrate should be necessary. For one would think that the glucose in the maternal blood which is universally held to pass across the placenta by diffusion—you see it stated in all text-books that glucose alone of the normal food-substances has been proved to pass across the placenta—I say, one would think that the glucose would constitute a sufficient supply of carbohydrate for the fœtus directly without being first synthetised into glycogen. But there are reasons for thinking that the commonly accepted idea regarding the passage of glucose across the placenta by purely physical laws has not been proved. It is founded on experiments of Cohnstein and Zuntz. They injected glucose into the maternal blood-stream, and found that in consequence the glucose of the fœtal blood was increased. Therefore, they say, glucose also passes as such normally.

But under the same experimental conditions which induce a hyperglycæmia, the kidneys and the sweat-glands also allow glucose to pass, and by the same process of reasoning we should arrive at this, that glucose passes into the urine and sweat normally, and this is obviously absurd. I am rather at a loss to know why Cohnstein and Zuntz's deductions have been passively accepted for so many years, when clinical experience goes to show that the conditions in hyperglycæmia are not the same as in a normal pregnancy. For it is well known that in diabetes mellitus the liquor amnii may contain glucose, though normally it does not.

There are in fact two points which are difficult to explain on the assumption that glucose does go across by reason of its diffusibility. The first is that the fœtal blood, at least in the earlier stages, contains only traces of glucose. The second is that, as Professor Paton and Dr Watson have lately shown, the fœtal blood of some animals contains lævulose while the maternal blood does not. I do not know how they themselves explain it, but it seems to me the most reasonable explanation is that the change is effected by the fœtal placenta, and that this organ prevents the diffusion of dextrose as such, and allows it to pass only after it is transformed.

Hence we need not feel so much surprise that in the rabbit the maternal placenta secretes glycogen for the fœtus, though there is glucose in relation to the fœtal tubules.

In its further course towards the fœtus, the glycogen is first absorbed by the syncytium. But it is not taken up as such, because no glycogen can be demonstrated in it. The same occurs in the liver. The hepatic cells store glycogen, but when it leaves the cells it is no longer glycogen. According to Bernard's theory, the glycogen is transformed to sugar by a ferment contained in the liver-cells, and I investigated the placenta to find if the same explanation is true for it. The results were very striking. In the sheep and cow, whose placentæ contain only traces of glycogen, the power of hydrolysing glycogen is very slight. In the rabbit, on the other hand, the placenta possesses a very active glycogen-splitting ferment, and further, the ferment action is much stronger in the fœtal placenta than in the maternal. Hence we may say that Bernard's theory is also tenable for the placenta, and that the absence of glycogen from the syncytium is due to its transformation into a sugar. What the sugar is, whether lævulose or not, I am not yet prepared to say.

Here, then, we have definite evidence, and that is the sort of evidence which it has been found hard to obtain, that the fœtal placenta has an active part to play in providing food-material for the fœtus, and does not act as a mere sieve or filter.

In its further course, the carbohydrate reaches the fœtal circulation, and it appears again as glycogen in the cells of many organs. I have already indicated its great importance to the fœtus by showing the close relationship that exists between its percentage and the rate of growth, and we have now to consider how it is that it holds so important a position.

We know that in the adult organism carbohydrates form a great source of energy, and in the fœtus of the rabbit they probably form the only source. This follows from the experiments of Bohr. I have not time to go into these in detail, but they are of great interest and significance. His results are two in number. The first is that the fœtus weight for weight absorbs slightly more oxygen and gives off slightly more carbonic dioxide than the mother. Hence combustions are very active in the fœtus, and a large source of energy is required for them. His second conclusion more nearly concerns us at present, namely, that the source of energy is carbohydrate, because the respiratory quotient, *i.e.*, the output of carbonic dioxide divided by the intake of oxygen, is unity.

Such, I think, is the explanation of the widespread distribution of glycogen in fœtal cells and its close relationship to the energy of growth.

In conclusion, I should like to point out that Bohr's work gives rise to a point of some importance in connection with eclampsia. Clinical records show that in a certain number of cases the emptying of the uterus leads to an immediate improvement in the patient, and naturally the suggestion was made that such cases may be due to a toxin passing from the fœtus to the mother. If Bohr is right in saying that the source of energy in the fœtus is carbohydrate, then the toxin must arise from a disordered carbohydrate metabolism. What the toxin is is still obscure. Some thought that sarcolactic acid, which probably arises in the catabolism of carbohydrates, was the poison, but there is no doubt that it is not the cause of the disease.

At the same time all the new facts regarding the catabolism, normal and abnormal, of carbohydrates must be carefully considered, in the hope that one may be found to explain the occurrence of eclampsia or other toxæmia of pregnancy.

*Dr Barbour* said that in the first place they must congratulate Dr Lochhead on the quality of the paper. It was the sort of paper that only came before their Society very rarely, and yet it was the kind of work which he thought established the reputation of their Society far beyond Edinburgh. And one could not but regret that scientific work of that kind was so much left to be done in the laboratories of Germany and America, and even now in the Colonies, and they did not in Edinburgh show the sort of work which he felt ought to be done in obstetrics and gynæcology—that very high class scientific investigation. The reason was that there were very few men who had the time at their disposal, and who were able to give their attention unreservedly to the investigation. Another thing that had interested him very much in the paper was the putting it alongside Dr Chipman's work. He thought Dr Lochhead rightly referred to the high quality of Dr Chipman's paper, and as Dr Lochhead was reading his own paper it reminded him more than once of Dr Chipman's work. It had interested him very much that Dr Chipman and Dr Lochhead had arrived at the same results from different standpoints. They might think that Dr Lochhead had simply followed in Dr Chipman's footsteps. It was not so. They had really worked along entirely different lines. Dr Chipman took the histological method, depending upon staining, which was a coarser, more diagrammatic method. Dr Lochhead used the more delicate and exact method of chemical analysis, but both had come to the same result. The very interesting point was the presence of glycogen in the maternal part of the placenta, its absence in the fœtal part of the placenta, and its presence again in the fœtal liver. Dr Chipman had found glycogen in great abundance just where the maternal part passes to the fœtal, then it suddenly disappeared from view, and the question was what had happened to it. Dr Lochhead had rightly pointed out that the glycogen spoken of as in the fœtal placenta was not really in the fœtal placenta, but in the maternal placenta adherent to the fœtal placenta. Dr Lochhead had demonstrated that they did not get it when they passed from the maternal to the fœtal placenta, and had brought forward a very important and new fact, that the fœtal placenta broke up the glycogen at once, so that it was not present as glycogen in what corresponded to the fœtal villi, that it was lost, and then again it reappeared in the fœtal liver. Important chemical changes, therefore, occurred in the villi. He supposed his view was that the liver acted as a storehouse of the glycogen. He congratulated Dr Lochhead heartily. He was pleased to hear that the paper was only the first of some other papers that he had promised to give them.

*Dr James Ritchie* congratulated the Society in having this original and very interesting communication made to it. Among the several interesting points which it presented, he thought that the most important was the demonstration that glycogen did not pass from the maternal blood to the fœtus by osmosis or by a purely physical process, but that it was separated by the maternal placental cells. The teaching in the time past had been that during the earlier months of fœtal life glycogen was equally distributed through the fœtal tissues, but that in the later months it was more limited in other parts of the fœtus, but greatly increased in quantity in the liver. Dr Lochhead's research demonstrated in part the truth of this. It had been supposed that in early fœtal life all the functions of secretion and excretion were carried on by the maternal organism, but that during the later period the fœtal organs gradually took on their respective functions. Dr Lochhead in two of his diagrams demonstrated the truth of this in relation to the glycogenic function of the maternal placenta and of the fœtal liver: the secretion of the placental cells gradually decreased until the day before delivery it was zero, that of the fœtal liver proportionately increased. Dr Ritchie was interested to hear Dr Lochhead's suggestion that the cause of eclampsia might be found in toxins produced in the fœtus and passing to the mother's blood. For long the speaker believed and had more than once suggested to the Society that the cause of eclampsia was peculiar to the individual pregnancy, and was to be found in the uterus.

*Dr B. P. Watson* had nothing to say except to thank Dr

Lochhead for his most interesting paper. He could not give him any explanation of the fact he had mentioned, that Dr Paton had detected the presence of lævulose in the liquor amnii and the fœtal blood. It must, he thought, be due, as Dr Lochhead had said, to some change in the placenta or some other organ in the fœtus after its transference. He thought that was the only possible explanation of the fact.

*The President* considered the paper a very valuable departure in the Society's work, somewhat resembling Dr Chipman's work, and also having its resemblance to Dr Watson's work on the liquor amnii. He was glad to hear from Dr Lochhead that physiologists were waking up to the importance of fœtal physiology. He was specially glad to hear it, because in writing his book on Antenatal Pathology—the first volume—it had been his chief difficulty to find any account of work on the subject of fœtal physiology. He was perfectly sure that physiologists would find not only an immense amount of interesting material, but that they might find the solution of some of the problems they had been unable to solve in the adult body. The relationship between the chemical physiology of the fœtus and the mother was subtle, but he thought it might throw light on such problems as glycogen formation, etc. He had one criticism to make as to choosing a placenta in which the parts (maternal and fœtal) could be easily separated. It was well to begin with such a placenta, but in order to apply these results one must allow a considerable margin. It would be well gradually to approach the human placenta through the other placentæ which were more intimately united. A possible chemical process might be considerably altered with parts much separated; even in the matter of transmission there might be considerable difference. He thought Dr Lochhead had done quite rightly to begin with one in which the maternal and fœtal positions could be easily separated. The explanation of the decrease of glycogen in the placenta and increase in the fœtal liver might be accounted for apart from transmission from one to the other. He was struck by the placenta gradually giving up its functions, and the fœtal organs gradually taking them on—not only the liver but also the thyroid and other fœtal organs. The placenta became senile and less active, and its functions were distributed among the fœtal organs, and, therefore, the placenta was an old organ before the fœtus was born. He asked Dr Lochhead whether any light had been thrown on the peculiar globules found in the spaces of the human placenta. Some thought they were little pieces of syncytium degenerated into something like a hyaline substance; others thought they might be transformed glycogen. Another point was whether the storing of glycogen in the liver was at all analogous to the storing of poisons in the liver that was found sometimes. Sometimes the poisons were found in the placenta, sometimes in the fœtal liver; was the explanation that sometimes they were passed on, and at other times were not passed on, especially the poisons, arsenic, copper, and others? A large amount of carbohydrate was used by the fœtus, and he supposed that was the cause of the greater temperature of the fœtus at birth. He had often wondered whether fœtal physiology as a whole had been contrasted with the physiology of a hibernating animal. It had always seemed to him as if the fœtus had a kind of physiological relationship to hibernating animals.

*Dr Lochhead* briefly replied.

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